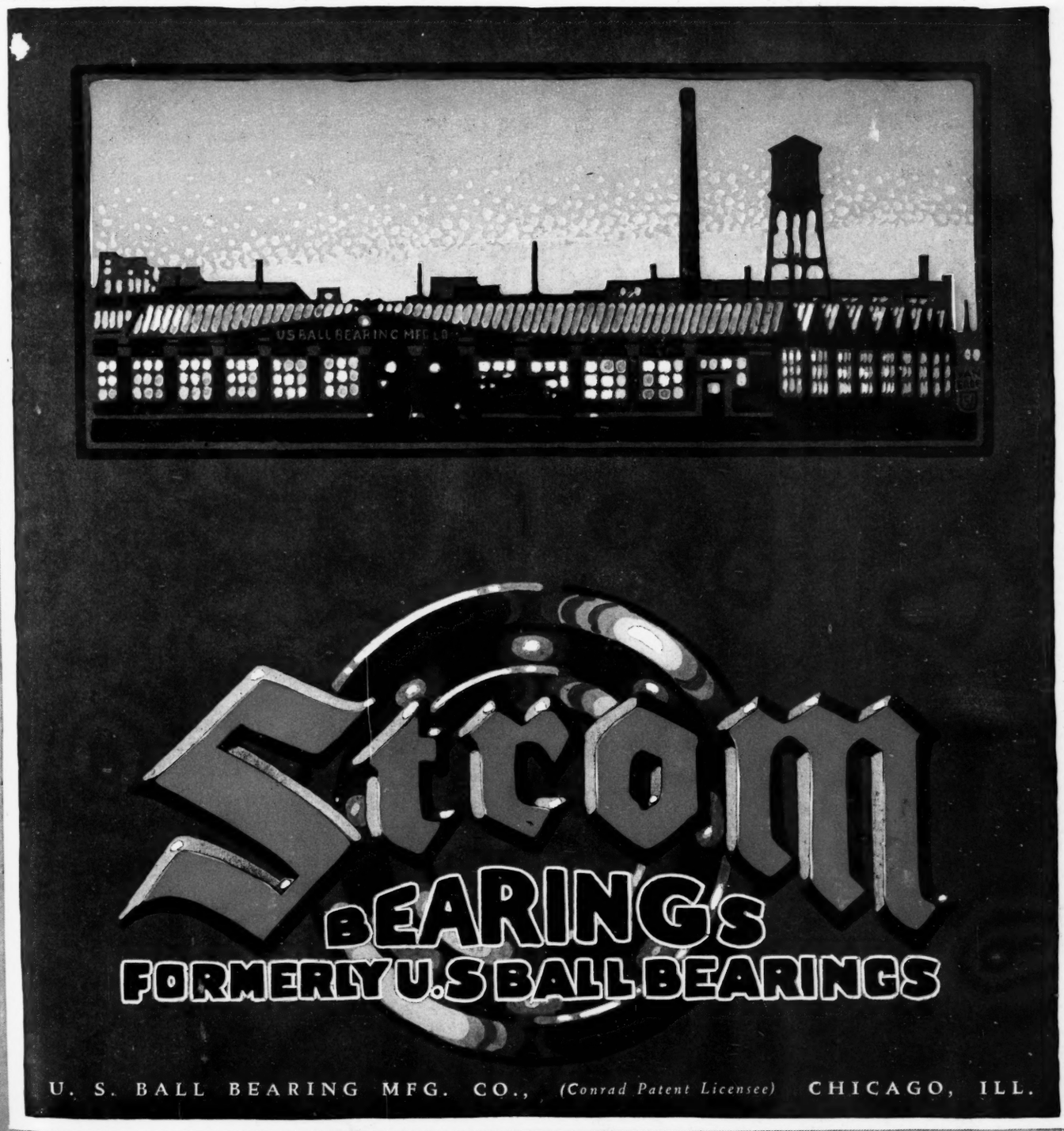
Special Chicago Show Issue

MOTOR AGE

Vol. XXXIII
No. 4

CHICAGO, JANUARY 24, 1918

Price 25 Cents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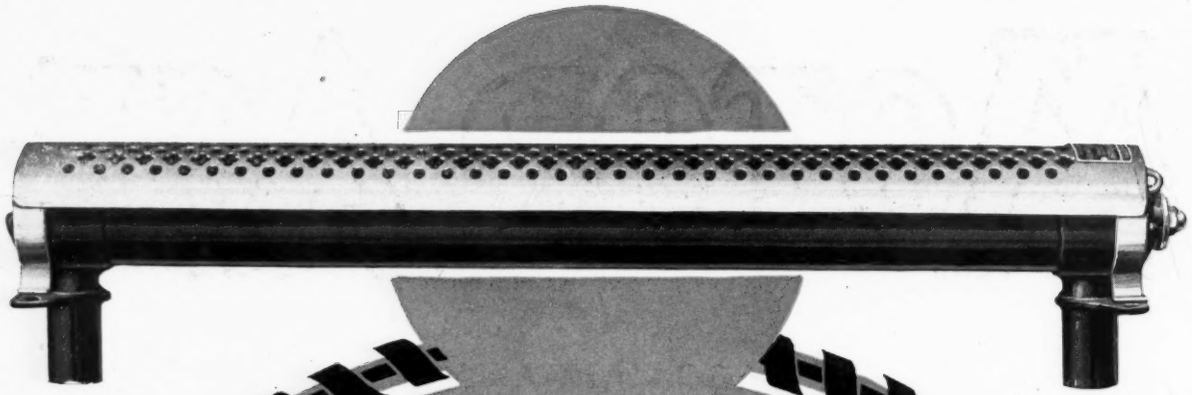

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MOTOR AGE

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Mallers Building
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WHY THIS NUMBER OF MOTOR AGE HAS BEEN DELAYED

In accordance with the ruling of the Fuel Administrator our engraving department and offices suspended business for the periods specified.

Incidentally, this happens to be a large size number and the fact that mail trains, like freight and passenger, are often delayed these days means that MOTOR AGE readers will receive this issue later than usual. This is part of the price of war and while it puts MOTOR AGE readers to some little inconvenience, MOTOR AGE feels that its readers will consider these conditions and realize that it is part of the co-operation we all owe in the successful termination of the war.

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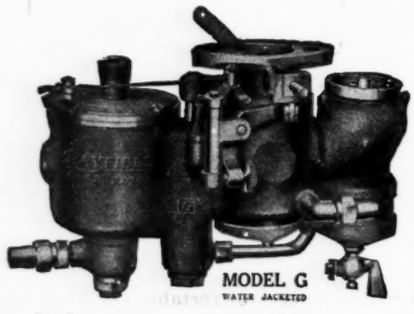

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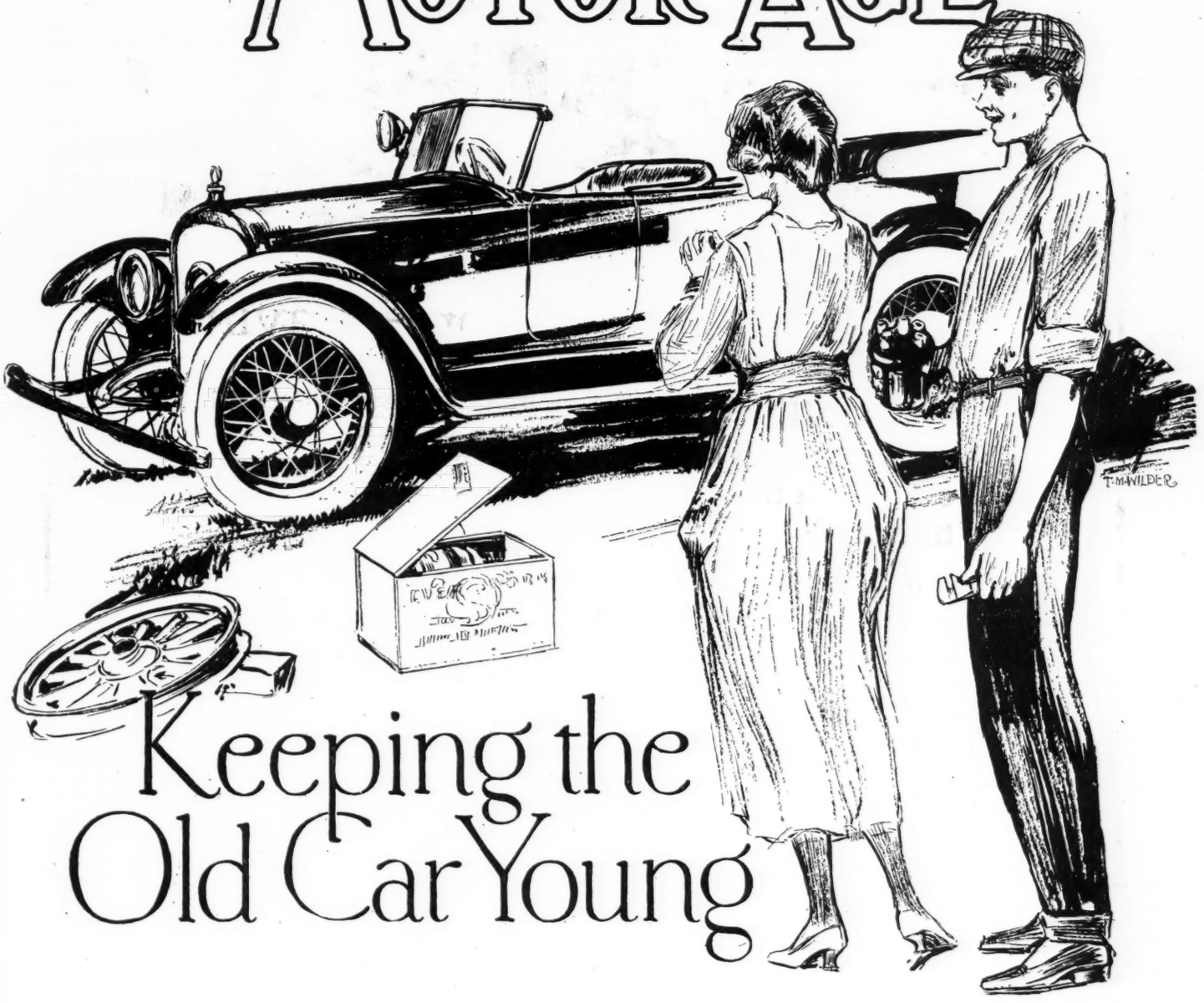


Keeping the Old Car Young

By H. C. Skinner
Motor Age Editorial Staff

THE motor car accessory industry is about to be plunged into the realm of opportunity and in the future will be in a position to be of greater service to the motoring public as a whole than ever before. Truly we are treading along a path of new conceptions, as the war has changed our entire aspect of life and we have emerged from an era of comparative freedom and non-restriction into a period of conservation of both ourselves and of the national resources. Already the drain on the man power of the United States is a noticeable reality and this loss will continue to grow in volume as more and more men are called to the colors. As a result of this it is apparent that the percentage of woman drivers will continue to increase and to compensate for the loss of the more skilled and physically stronger men, every conceivable device must be injected into service to facilitate the operation of cars by women.

The army needs motor mechanics and great numbers of these probably will be withdrawn from the industry to carry on the war and as the industry, especially that relating to the servicing of cars, is still comparatively young, likewise are the men engaged in it, and as great numbers of these are within the range of the draft, it is expected that in the future the problem of service for motor cars will become a most pertinent one. Thus it may fall to the lot of the driver in many instances to care for the car which that person is driving and as women will probably be the parties concerned in the majority of cases, every effort must be made to make the care of cars as simple and effective as possible.

It is expected that in the future the old car must perforce be made to endure longer than its predecessors have in the past. Toward this end then the accessory industry must be accelerated to provide devices to keep the old car young so that it may be capable of meeting successfully the contingencies that may arise.

Some of the prime requisites to aid the woman driver are comfort in winter driving, and ease of operation and care. To avoid the expense in connection with an enclosed body for winter driving it is expected that the use of glass panels in unit with the customary top will be in greater favor than ever next fall. This substitute for the closed type of body can be made very comfortable by the use of some form of interior car heater whether it be of the exhaust gas type or otherwise. By these

Now that women are to be more often in charge of the car such aids to driving as heaters, glass panels and one-man tops are essential to make operation of the car easier for them

means the touring car can be converted into a satisfactory car for winter use.

In the past the physical effort required to operate some of our American cars has restricted the use of them by women especially with regard to steering and braking. A study of these designs reveals that the applications of some of our more modern ideas concerning chassis construction will eliminate some of these absurdities.

The trend in design indicates that the braking system is receiving more attention from engineers resulting in more easily controlled cars, an important factor, when it is considered that women in the future will do considerable driving.

Controls for Cripples

If the war endures long enough for our forces to become actively engaged on the firing line on a large scale, we will have many cripples who will handle cars and the control of cars for them must be simplified to make this possible. There will be many cases of control to suit individual drivers. Some that will require single-pedal control for either the right or left foot in which the clutch and brake must be combined in one. This is done in some of the current designs and will not present a difficult problem.

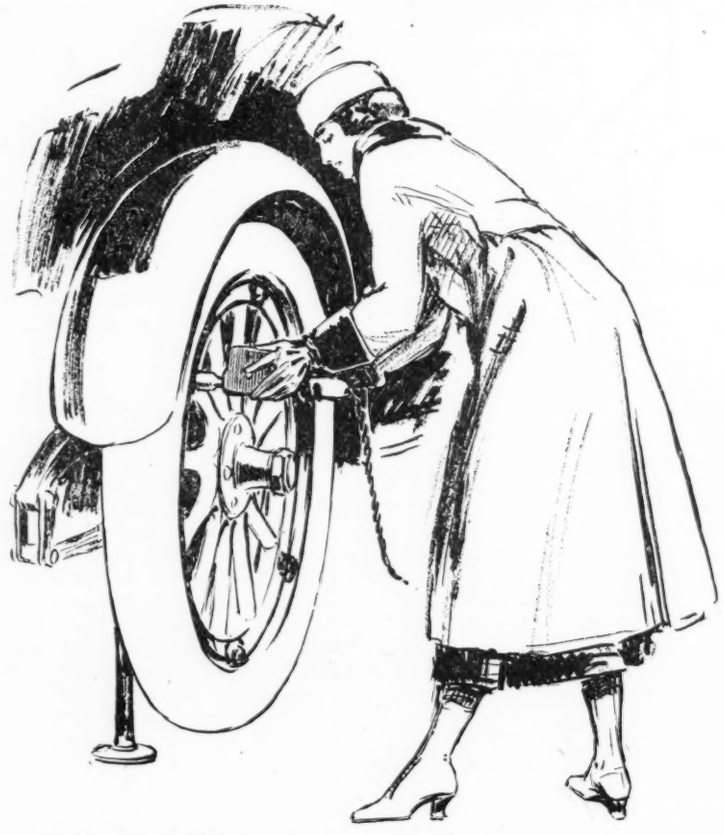
Controls for persons with one arm are more difficult than those for persons with only one limb. It would be possible to arrange the gear changing mechanism so that it could be operated by one foot and with this system it would be advisable to have the clutch and service brake in a unit on one pedal. Thus when declutching, the operator would have the left foot for the manipulation of the combined clutch and brake pedal and the other for the control of the gear change while retaining the use of the one arm for the steering of the car. Then when slowing down for a crossing the operator maintains control of the engine by the foot throttle operated by the right foot.

The electric or magnetic gear change by solenoid coils in the gear box and the electric transmission also offer methods of control which may be centralized and thus simplify the operation for the driver as these controls can be located on the steering wheel proper.

In some instances we may be able to increase the ease of steering by more castor action or by the addition of a larger diameter steering wheel giving more power for control of the vehicle with approximately the same effort expended.

These principles may be even carried further and applied to the brakes, where the leverage may be increased without dire effects due to the increased life and ability of the more modern brake linings. Even the economic side of motoring may be given more consideration by increasing the fuel mileage due to the use of more modern carbureters designed for the heavy fuels of to-day and their accompaning sundries, some of which give very satisfactory results simply by harnessing the waste heat of the exhaust.

Tire changing always has been a real



An electric wrench to assist in removing tires is one of the accessories the future may bring

bugbear of motoring and is a difficult task for a man not to mention a woman, performing such a change. A flat tire necessitates the use of a rim wrench which with a few rusted rim lugs makes it almost impossible for a woman to loosen the rim. Would it not be feasible to develop a power rim wrench? The small series-wound electric motor with its characteristic high starting torque and a suitable reduction gear would undoubtedly make a most useful tool toward simplifying the care of motor cars by women.

New forms of rims also afford opportunities of making it easier to change tires. Possibily a one-bolt rim, locked with a draw ring could be developed which would make tire changing a less hardship and with more speed. Wire wheels may be removed by loosening the retaining lock nut but even some of these are almost impossible to remove after they have been mounted for a long period due to the fact that they become rusted on the wheel hub. However, if they are properly lubricated, changing a wheel of this type can be accomplished without difficulty.

Raising the car from the ground is the most irksome part of the tire change as with the modern jack this is both a dirty and hard job. There is no reason why a jack operated by mechanical, hydraulic or pneumatic means cannot be developed. Jacks also could be carried integral with the chassis, eliminating the necessity of having to crawl under the vehicle to place the jack in position for use. A power jack has been brought out in England which is permanently attached to the chassis and raises the entire car from the ground in a very short time, making it possible to work on any one of the four wheels.

However, the motor car in order to be an enduring vehicle, must have a certain amount of care and this regularly. The possibilities in this field are almost unlimited as the subject of chassis lubrication is still in its infancy so far as most standard products are concerned. In this respect picture for yourself an inexperienced woman attempting to manipulate the inaccessible and dirty grease cup so prominent a number of years ago and still considered by some as good practice in this day of refinement.

The care of a car can be simplified and the soiled clothes almost eliminated by the use of oil cups instead of grease cups. The oil system of lubrication is simplicity in itself as the lubricant can be cleanly and conveniently handled. If we could be accurate prophets of the future we would venture to say that the car of to-morrow will have but one oil aperture and that will probably be the one now referred to as the filler spout used in connection with the engine oil reservoir. From this one supply the entire mechanism of the motor car will be lubricated by means of pressure feed.

However, let us confine ourselves to what we must do to our old car in order to prevent it from becoming an extinct species. This is a vital problem which is becoming more so each day and we will undoubtedly pass through the same era regarding the mechanical rehabilitation of our cars as have our British cousins. Of course, we do not mean to insinuate that we will be motoring about the town with gas bags superimposed upon our tops.

Service at Low Cost

Practically every car a year or so old can be placed in serviceable mechanical condition by a relatively small expense in comparison to its intrinsic value. In the past, the average American owner has not expected to keep a certain car for more than two years at the utmost. After a year or so he has disposed of it for a more recent model.

In the future, owners probably will drive their cars over a longer period and consequently will require the addition of accessories from time to time to maintain them in a more or less modern condition. It is evident that the rebuilding of cars in the future will be practiced to a greater extent than at present as in so doing the owner can then express his own idea in what he desires in a motor car.

Internally, the rebuilding of an old car generally confines itself to the engine in which almost every owner desires to inject as much life as possible. This can be accomplished in a number of varied manners but a study of the old designs reveals that the activity of the older engines, especially the four-cylinder types, is limited by the weight of the reciprocating parts of both the engine proper and the valve gear. Modern materials of construction have made possible the reduction in weight of these parts.

For instance the present high tensile steels can be utilized to manufacture lighter-weight connecting rods and also lighter valves and push rods. Pistons weight have witnessed a most remarkable reduction in weight due to the advent of aluminum alloys and better grades of gray iron especially developed for this purpose. It is the weight of these parts that prevent the old engines from competing with their more modern and highly developed successors on account of the large bearing loads and the loss of the timing characteristics due to the weight of the valve gear at high engine speeds. Consequently the maximum power is less and is developed at a less crankshaft speed. It is not a difficult matter to obtain such parts as these from accessory stores and is very interesting work to those who are the least bit mechanically inclined.

Speed should not be the goal sought for in this work as smoothness of operation and longevity are the desirable factors. A good car once placed in good mechanical condition is indeed a true friend, perhaps more so than some of those bodies that belong to the civilization of our own times, as a mechanical machine will collapse in a less number of instances than the corresponding human one.

We believe from observations that the modern owner is becoming more interested in his car than he was a few years ago, as the cars exemplify this by their neat appearance and by the manner in which they perform when seen upon the road.

Macaulay, the historian of England, said that the development of civilization to a higher degree depended upon the rapidity of the various modes of travel. Think of

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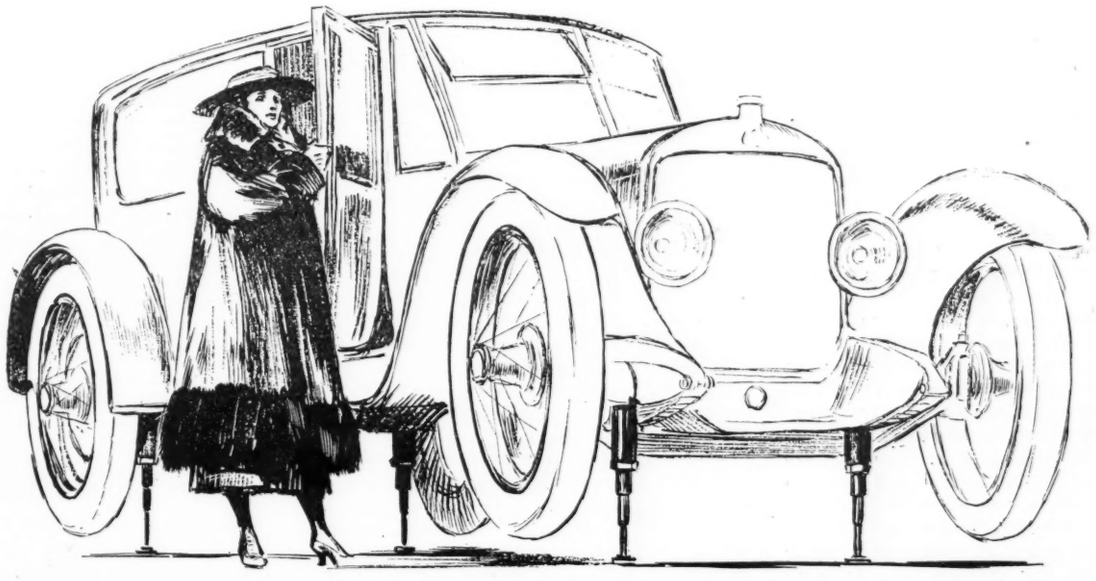


By the mere pressing of a button to raise tire-punctured car on jacks would be paradise enow, wouldn't it?

My Accessory Ideal

The Dreams of Today Become the Realities of Tomorrow

FINALITY is a hopeless thing to struggle for. Each year brings out new fitments for the car and as time goes on one wonders what further refinement can be added to the more nearly perfect motor car. Great surprises at show times are almost things of the past and car accessories that at first seem new often resolve themselves into new applications of old ideas. For example, tires are just about as hard to remove now as they were some years ago, and this in spite of all of the many tools and instruments designed for the purpose.

Many women refrain from taking out a car for fear that they may be caught on the road with a flat tire, which they know they have not the strength to remove and replace with modern equipment. Then, too, there are the old offenders—spark plugs, which often get stuck so tight in the cylinders that ordinary wrenches fail to remove them. And so we might go on and enumerate other details in the car's equipment, which although vitally necessary, have not kept pace with the remarkable strides in allied fields such as starting and lighting, engine driven tire pumps, thermostatic control, etc.

The war has placed the motor car in position where it never has been before, for with the present demand for man power we find more women drivers. Also many owners who heretofore have intrusted the driving and maintenance of their cars to chauffeurs have in many instances released them for war duty and taken the responsibility of caring for the car to themselves. To many of these men this is an entirely new form of work, in fact, a privation for those not mechanically inclined. The motor car has become one of the most necessary forms of transportation and therefore its maintenance must be kept as simple and economical a thing as possible if women are to succeed as competent caretakers. The actual driving of the car, aside from the bugbear of gearshifting, offers no particular stumbling block to the average woman, but let her change a tire or clean out the carbon!

The Power Jack

Many of us after making the rounds of the accessory booths continue to search for that one ideal accessory we have longed for, which may be a jack we often imagined we should like to own, one that could be attached permanently to the four corners of our car and by merely throwing a switch or actuating a small lever, elevate one or all wheels off the road. We have all seen great trucks operating in the larger cities which carry several tons of coal and dump the entire load by tilting the body rearward using the engine power. If we can do this with such an enormous load, why not use the power of our passenger car engine to elevate the car instead of having to get out and get under? Or, you may prefer to do it electrically. The modern gasoline car carries a complete electric power plant, so why not utilize the energy derived from it to actuate our automatic jacks? Still another way would be to use water; hydraulically so to speak. Elevators and barber's chairs are raised and lowered so. Where get the water? From the radiator. Enough water for this could be let into the hydraulic jacks by opening a valve leading to the water system and returned by pressure when the weight of the car forced the pump pistons of the jacks down. The coming car must be automatically jacked up and down and carry its jacks neatly tucked away under the car frame.

The No-Man Top

We have all encountered the one-man top which at best takes two to manipulate properly. But what about a no-man top? Surely some enterprising top manufacturer will not stand idle in this progressive era and claim that perfection has been attained in the modern top. Admittedly the present types are far superior to the cumbersome overhead structures of yesterday, but here again why not let the engine do it? The machinery could be set going and, presto, the top unfurls itself gracefully from under the rear deck and snaps onto the windshield supports. No more scrambling from side to side to slip this bow in position, or fasten a strap here. Surely our coming car must have an automatic no-man top.

Hinged Cylinder Head

What owner has not wrestled with the head on his engine to dig out the carbon from its inside and from the pistons? Every internal combustion engine demands this treatment at various times in its career. Some more than others. The detachable cylinder head was a step in the right direction, but when first adopted, was pronounced utterly impractical by various experts. They said the joint could never be made tight. The joint has been made tight. However, to do this it is necessary to hold the head in place by studs anywhere from fourteen to twenty in number. These studs, or cap screws, possess faculties of becoming stuck in the cylinder casting and refuse to be dislodged by ordinary treatment. Many of us have twisted off a head in a vain attempt to coax one loose. And there are so many to take out!

Why not fit the coming car with a detachable cylinder head hinged to the block on one side and fastened with a suitable catch or lock on the opposite side, interposing a gasket between the parts? Imagine unlocking a device on the side of the engine and lifting the head up like the lid of a box. Think how quickly you could examine the plug points without removing the plugs from the head. Carbon removal would become a pleasure and the business man could clean out his engine every morning before driving to the office. Surely we shall expect to see a hinged cylinder head on the coming car.

Electric-Air Brake

The modern motor car with its high speed capabilities demands an efficient braking system as never before.

It must be stopped quickly at times and this means the use of both feet on the pedals and one hand on the emergency lever. On some large cars this requires much effort on the part of the driver. An interurban car or steam train can be stopped with less effort than a motor car—by merely swinging the air brake lever to one side. The same could be done with motor cars. A button, for instance, could be placed on the steering column or wheel which when depressed would actuate an electric or air brake smoother in operation than most of the present pedal operated affairs. The comi car should have an electric or vacuum-operated brake system.

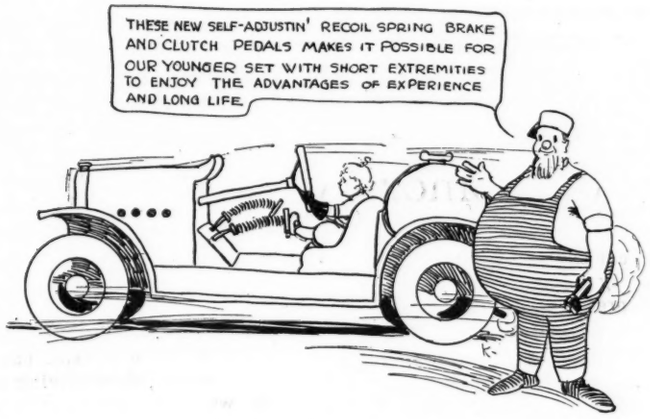
Quick Detachable Plug

So long as spark plugs are made with the conventional screw thread base we shall have sticking plugs, which may require anywhere from 3 to 10 or more minutes to dislodge. We have seen wrenches with the jaws rounded off from grappling with an obstinate plug. Sometimes in fact, we let our engines sputter and bang in an erose manner just because a faulty plug is so hard to get out. It may require only cleaning or adjustment of the points and yet action is deferred until the cylinder actually ceases to fire.

Then we have to bring out the 16-in. Stillson after all humane methods, like heating with a blow torch and kerosene applications, have failed. Let's have a plug fashioned after the breech block of the modern coast defense guns. Plugs that need be given only a quarter twist or so to lock them in place. Perhaps the part usually threaded could be made in the shape of a long cone with projections cast on it to fit corresponding recesses cut in the cylinder head like a bayonet socket. Such a conical seat would be gas-tight and the lugs serve to hold the plug firmly. Many of our woman drivers would welcome such a plug.

Power-Driven Rim Wrench

Demountable rims still have to be kept in position by wedges and bolts, the nuts of which get rusted or stuck so tight that tools furnished for their removal are too


THESE NEW SELF-ADJUSTIN' RECOIL SPRING BRAKE AND CLUTCH PEDALS MAKES IT POSSIBLE FOR OUR YOUNGER SET WITH SHORT EXTREMITIES TO ENJOY THE ADVANTAGES OF EXPERIENCE AND LONG LIFE.

puny to cope with them. These tools take the shape usually of a carpenter's brace, but the sweep is so small on some of them that the operator cannot get a good leverage to back off an obstinate nut.

If we had a power-driven socket wrench, perhaps the removal of rims would be facilitated. Such wrenches could be fitted with a flexible shaft, one end of which would attach to a convenient coupling driven off the engine, or electrically, as the case may be. A power-driven rim wrench would mean fewer skinned knuckles and we shall expect one in the equipment of the coming car.

Folding Pet Cock Handle

All of us have occasion at times to prime our engines. It means opening the pet cocks on top of the cylinder block and what a job on some! The handles are too short and we twist them off many times in coaxing them loose with pliers. It goes without saying that the handle gets hot, so most times we have to use gloves or a rag to catch hold of them. It seems these handles could be made to fold up in such a way that when unfolded they would present a small lever say about 3 in. long. This would be long enough to offer plenty of leverage and in addition the outer end could be fitted with a heat insulated material like some of the ever-cool handles on frying pans. The coming car should be fitted with such pet cocks, not only those for priming, but the ones for draining the crankcase, radiator, etc.

Mixture Indicator

How many of us know when we are running on too rich or too lean a mixture? At best we can only guess as to how much of our fuel is doing useful work; how much of it is properly burned. Let's have a mixture indicator on the instrument board to tell us at a glance how economically or how lavishly we are running. This we could do by passing the exhaust gases through a solution of some sort and observe the resulting color. For instance, if the solution remained colorless at all times it would indicate a correct proportioned mixture, neither too rich or too lean. If, however, it took on a red color—the danger sign—it would indicate too much gasoline and we should have to shut down on the carbureter adjustment. A blue color would indicate too much air, in other words we should be starving the engine.

This in our mind would be a real accessory. Especially in such times as these when conservation of fuel is on every lip. Analysis of gases is made this way in chemical laboratories to ascertain whether they are rich or poor in some substances, therefore is it not possible that the car owner might be given some device to tell him as to the quality of his mixture? This is the most difficult thing the motorist has to contend with and there is opportunity here for an accessory really worth while.

Automatic Windshield Cleaner

How aggravating to have to reach over the steering wheel on a stormy night and wipe the rain or snow off the windshield. You who drive all have had to do it at times we venture. There are windshield cleaners that accomplish this, of course, but they must be manually operated. Why not arrange a rack and pinion affair that would cause a sliding block, to which was attached the cleaner, to travel back and forth over the glass surface slowly and wipe foreign matter off? It could be operated electrically and need be employed only a minute or so at a time. The rack could be made of a narrow strip of metal and fastened to the bottom of the windshield frame.

Indicating Electrolyte Level

Storage battery men tell us that we must keep the electrolyte in our batteries above the top of the plates. The only way we have of finding out the height of the liquid at present is to lift the flood boards, remove the vent caps on the cells and peer into the openings. We have oil gages which tell us the amount or height of the oil in the crankcase, so why not a gage for the battery electrolyte level? Perhaps a small float could be put in the battery and connected by suitable means to an indicating device on the dash. Along with this might be an instrument to tell us about the specific gravity of the solution, eliminating the use of a hydrometer. Steam boilers have water gages on them, so why not the battery?

Keeping the Car Young

(Concluded from page 7)

the possibilities that your old motor car brought to your door when you first drove it home.

In keeping the old car young, what can be done to improve its external appearance? Modernization of its lines does much toward making an old car attractive to its owner. It is surprising to note what a change a set of fenders designed to harmonize with the remainder of the body and embodying some of the more modern tendencies will do for a car. The finish can be preserved and made to endure longer by care in cleansing and the use of a suitable body wax which will maintain its luster by partially offsetting the effects of the weather. Cars should be kept in a place of even temperature of a moderate degree as sudden changes in temperature is one of the worst enemies of paint.

Refinishing of bodies has in recent years been reduced to a more economical basis, hence one can have a car refinished for a nominal sum over that which it once cost. A new coat of paint will do wonders for an old car and improve its appearance to a remarkable degree. Conveniences in the body such as one-man tops, door curtain carriers for the curtains, new forms of windshields either of the front or division type and the miscellaneous lighting sundries such as spotlights, running board lamps are most desirable. All of these things, even if some of them are small, details lend to the appointments of a body.

The owner who intends to rehabilitate his present car from experience gained from past seasons, will look to increasing the comfort of its occupants. Of course it is impossible for the manufacturer to construct a car that will fit the physical being of all people.

There are other things such as trunks, toilet sets, etc., which add to the comforts of traveling. Camping outfits make possible long trips in moderate weather on a most economical basis and perhaps this method of touring is the most beneficial.

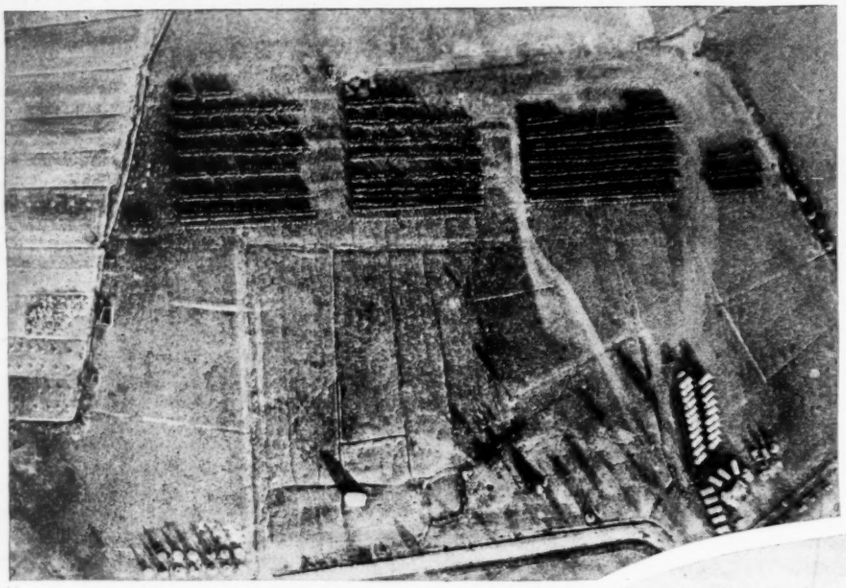
We are frequently asked, what of the future? The post-war car and the car of to-morrow will be a different vehicle from that of to-day at least with regard to control. This may consist of a single-lever control which will combine in it the speed control, the clutch, and the powers of braking.

Ease in Braking

Perhaps in its neutral position the entire machine will be at rest and a slight movement of the lever on the quadrant in a forward position will start the power plant and then further movement will start the car in motion. Then the braking may be accomplished by movement of the lever backwards from the neutral position, crossing this position rapidly enough so as not to affect the operation of the powerplant. Movement in a reverse direction to be accomplished by a drop notch just ahead of the neutral position.

The power plant and the transmission system may be an internal combustion engine-electric outfit. Possibly the engine may operate on a more efficient cycle not yet exploited or on the Deisel cycle which is the most efficient of the known cycles for internal combustion engines. Taken as a whole, the car of the future will have its control simplified, its maintenance made easier and a highly flexible power plant.

FIGHTING THE WAR BY PLANE, CAR AND TRUCK "OVER THERE" AND IN THE U. S. A.

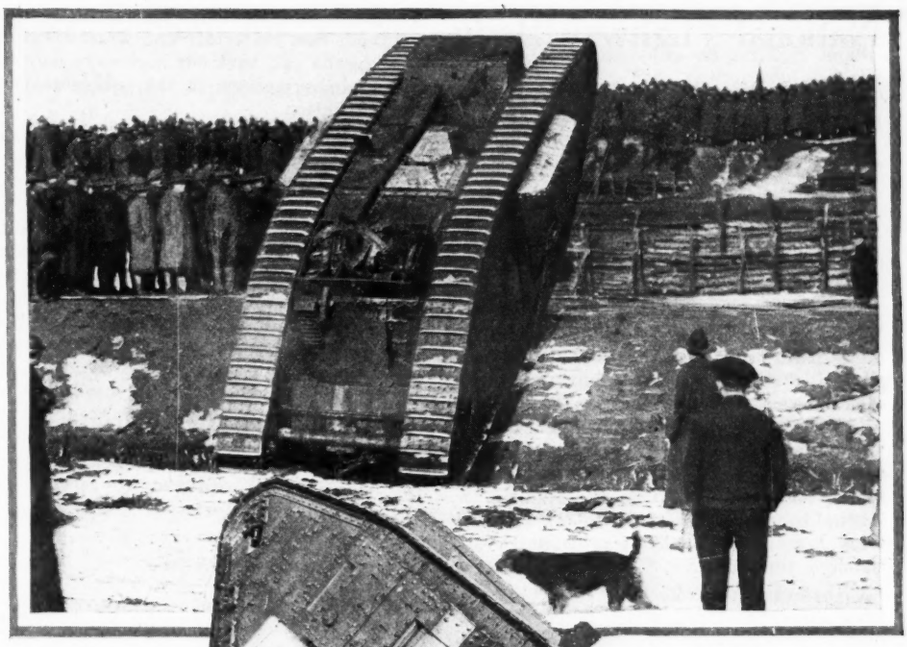


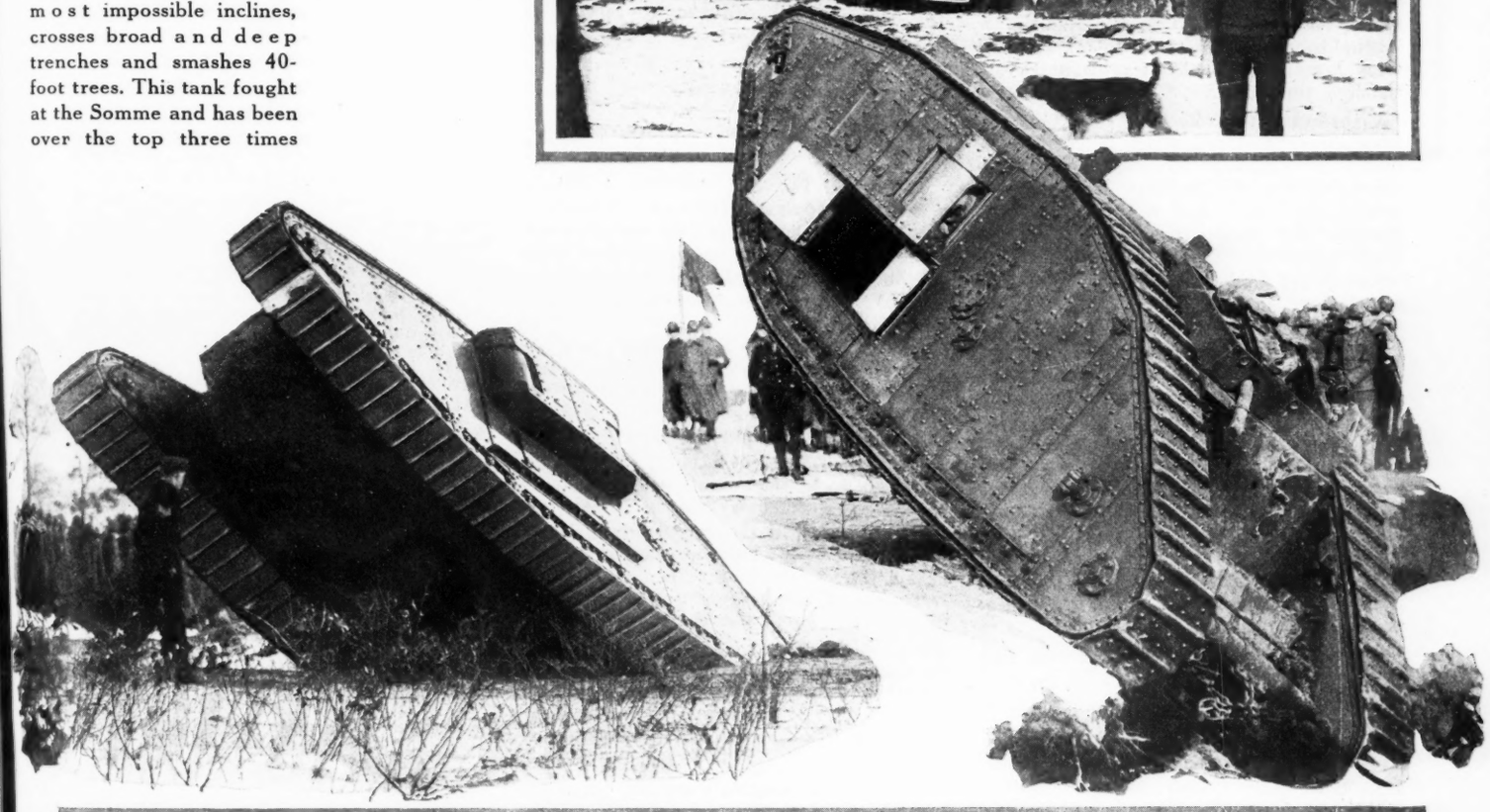
A remarkable view of an Allied flying field and camp from an airplane. This might almost be landscape gardening in its order

An air man's view of British troops drawn up for a talk by the general just before entering the trenches. The right battalion is at attention evidently, while the other two are at ease. Below, a long train of French trucks is speeding over a road in Macedonia, transporting soldiers

The four views on this page are of different demonstrations by the British tank Brittania, which is demonstrating phases of tank warfare in France before the officers and men of the different cantonments throughout this country. These pictures were taken at Camp Upton

The Brittania weighs 36 tons, travels over rough country, hills, banks and trenches at 4 m. p. h. and is armed with six Lewis machine guns, climbs almost impossible inclines, crosses broad and deep trenches and smashes 40-foot trees. This tank fought at the Somme and has been over the top three times





National Highway Body

To Co-ordinate Roads of Country With Other Transportation Facilities

Would Cheapen Handling of Food and Material

CHICAGO, Jan. 21—The building and maintenance of permanent highways along main trunk line routes for the transportation of people and goods to supplement the railroads is a national necessity and all efforts must be put on linking up this disjointed section of such routes rather than promiscuous buidling of roads of secondary importance during the war. This is the consensus of the Highway Industries Association, which was organized in Chicago yesterday.

Co-ordination of efforts of state highway associations and industries interested directly in highway building toward encouraging the development of roads and stimulating their use to facilitate and cheapen the transportation of food and other products was given a distinct interest in the final organization of the new association.

One of the points of greatest interest brought out was the announcement by James I. Blakeslee, fourth assistant postmaster general, who is in charge of the rural delivery systems of the country, that if plans work out as expected there will be motor truck parcel post within a short time under operation by the Government between all principal points. One complete system which will be in operation within the next sixty days, according to these plans, is a route between Chicago, Indianapolis, Louisville, Nashville, Chattanooga and Atlanta, connecting with a similar route between Portland, Me., and New Orleans.

Of National Importance

The organization of the Highway Industries Committee was one of national importance, as it brought together representatives from the United States Government as well as road machinery and material concerns with the highway organizations and state highway officials of the country. Over 150 delegates who were present represented 1,500 separate plants with a combined capital of $400,000,000. Formation of the organization was the outgrowth of preliminary meetings attended by representatives of the industries, officials of public roads, the Council of National Defense, Highway Transport Committee and the Executive Committee of the American Association of State Highway Officials.

The objects of the organization as outlined in the call to the meetings are to assist through co-operation with all governmental agencies, both state and national, the co-ordination of the highways with other transportation agencies of the country; second, to encourage the development of highways that will advance the economic life of the nation, and, third, to stimulate their use in such manner as to facilitate and cheapen the transportation of food, raw materials and finished products to the end that our highways may be of maximum service in the transportation of the nation.

S. M. Williams of the Gramm-Bernstein Co., Lima, Ohio, was elected president; A. R. Hurst, Wisconsin state commissioner of highways, first vice-president; Leon Gardiner, New York, second vice-president, and S. T. Henry, Washington, third vice-president. Secretary and treasurer are to be appointed by the board of directors. Headquarters of the association probably will be located either in Chicago or Cleveland, although on account of present conditions the head office probably will be located temporarily in Washington. The Highway Industries Association will not conflict with any other good roads organization, but will endeavor to specialize and co-ordinate efforts of the scattered organization.

Highway Officials Petition

Richmond, Va., Jan. 18—The American Association of State Highway Officials has drawn up resolutions asking for shipment of highway material and presented them to the Government through the director-general of railroads. The resolutions are as follows:

Whereas, The proper construction and maintenance of the highways of the country is necessary to the successful conduct of the war; and

Whereas, The plans of all highway authorities in the country, all users of highways and all citizens interested in any way in highway construction and maintenance are at the present time upset and tied up; and

Whereas, There is need for a definite policy so that plans can be formulated for the coming year; and

Whereas, A properly outlined policy directing the construction and maintenance of such roads and streets as are of general economic and military value will conserve the resources of the country and will greatly facilitate the transportation of freight over highways and streets, therefore be it

Resolved, That the American Association of State Highway Officials request the United States Government to formulate and promulgate as soon as possible a definite policy for road and street construction and maintenance, and

That it is requested that said policy contain a statement that freight cars shall be furnished next spring for the transportation of the necessary materials for the construction and maintenance of streets and roads of economic or military value.

LARGE TRUCKING CONCERN

Toledo, Ohio, Jan. 18—Albert N. Reis, retired commission merchant, heads a $1,500,000 corporation of Cleveland, Toledo, Detroit and Chicago business men to operate 100 trucks between those cities. These will operate in trains of five trucks each, each train carrying ten drivers and two mechanics. A tentative schedule allows 12 hr. from Cleveland to Toledo; 5 hr., Toledo to Detroit; 18 hr., Toledo to Cincinnati; and 24 hr. from Toledo to Chicago. Option is taken on a service station site in Cleveland. It is possible the Government may establish such a route, as investigations already have been made.

Chicago Show Ready

Fuel Order May Close It One Day, but Exhibition Plans for Big Week

258 Accessory and Ninety-two Car Makers Have Space

CHICAGO, Jan. 22—A tie-up of transportation is not affecting displays seriously for the annual show at the Coliseum, as a larger percentage of the displays are now on hand than has been the case at this period of the week before the opening in previous years. Manufacturers instead of sending all their cars from the New York exhibit to a greater extent have dispatched them from the home factories, thus saving time and railroad charges. Despite the traffic congestion, the fuel conservation order and other abnormal situations, prospects for a good show from a business standpoint are bright. As usual the Chicago show will be the business show of the year and it is almost certain that it will exceed the recent exhibition in New York from the standpoint of business done and possibly also from the standpoint of attendance.

As to just what will be done as to closing the show on account of the fuel conservation order has not been decided definitely even at this date. It is probable that the building will be closed completely on Monday as well as on Sunday. There is a possibility, however, that the doors may be opened on Monday to dealers only, although the building will not be heated and possibly will not be lighted. Manager S. A. Miles intends to live up to the spirit and letter of the order and probably will not even burn the lights on Monday whether the doors are open or not. Inasmuch as the windows are completely obscured by decorations he feels little advantage is to be gained by opening the doors even to the dealers. The show, therefore, will be open to the public Saturday and from Tuesday to the following Saturday.

350 Chicago Exhibitors

Of the 350 exhibitors 258 are displaying their accessories and parts and ninety-two manufacturers are showing 400 cars and chassis. Three cars not shown at the New York exhibition will be on display, namely the Maibohm, Comet and Pan-American. There will be more dealers' meetings and conventions than at New York, the most important of which is the war dinner at the Society of Automotive Engineers at which 1500 people will be present. Decorations have a distinctly patriotic note, the feature of which is an art glass American flag, 50 by 20 ft., and flags of America and its allies form the main part of the scheme of embellishment of the Coliseum.

Overhead both in the Coliseum and the Armory is a vast canopy of sky-blue studded with thousands of different sized white and gold stars. Clusters of star lights hang on a level with the balcony, shedding a soft glow on the exhibit below. From the rails of the balcony are gorgeous bannerettes of Allied flags and between them are placed medallions of the states in

which the motor industry plays an important part. Formations of arches with transparent star effects are placed along the sides and in front are batteries upon batteries of Allied flags bound with seals and showing the seals of different nations. The First Regiment armory has a similar scheme of decoration with the predominating colors in red, white and blue. Another patriotic scheme commented upon at the New York show will be in evidence in Chicago in the service flags at the different booths, which indicate in a measure the vast number of skilled motor men who have answered the call to the colors.

Manager Miles has set special days. Among them is Army and Navy day Tuesday, when the uniform will constitute a ticket of admission. Wednesday will be Society day and Friday, Society and Automotive Engineers' day.

MORE ACCESSORY EXHIBITORS

New York, Jan. 19—The Motor & Accessory Manufacturers' Association has added these concerns to the list of exhibitors at the Chicago show:

Air Device Co.....Chicago
F. A. Ames Co.....Owensboro, Ky.
Anderson Forge & Machine Co.....Detroit
Auto Pedal Pump Sales Corp.....New York
Bay State Pump Co.....Boston, Mass.
Carburetor Mantle Co., Inc.....New York
Copeman Laboratories, Inc.....Flint, Mich.
G. L. W. Spring Oiler Co.....San Diego, Cal.
Gibraltar Jack Co.....New York
Guarantee Liquid Measure Co...Pittsburgh, Pa.
McCord Mfg. Co.....Detroit
Menominee Electric Products Co.....New York
Miller Transmission Co.....New York
New Era Spring & Specialty Co.....Grand Rapids, Mich.
Wm. E. Pratt Mfg. Co.....Chicago
Rajah Auto Supply Co.....Bloomfield, N. J.
Rand Mfg. Co.....Haverhill, Mass.
Rex Mfg. Co.....Connersville, Ind.
Taft-Pierce Mfg. Co.....Woonsocket, R. I.
C. R. Wilson Body Co.....Detroit
Wire Wheel Corp. of America....Buffalo, N. Y.
Woodworth Mfg. Co.....Niagara Falls, N. Y.

LANSING FIRMS IN WAR COMBINE

Lansing, Mich., Jan. 18—Eighteen Lansing firms have organized as the Lansing Allied Industries to handle Government work. An office has been opened in Washington and Government contracts will be passed from factory to factory until completed. The following are the concerns in the new organization: Gier Pressed Steel Co., Prudden Wheel Co., Novo Engine Co., Auto Body Co., New Way Motor Co., Auto Wheel Co., Dail Steel Products Co., Reo Motor Car Co., Michigan Screw Co., Lansing Stamping & Tool Co., Hugh Lyons & Co., Lansing Foundry Co., Eureka Machine Co., Reliance Engineering Co., Lansing Co., Ideal Engine Co., Olds Motor Works, Duplex Truck Co., Lansing Forge Co.

JACKSON GETS MUNITIONS ORDER

Jackson, Mich., Jan. 18—The Jackson Munitions Corp. received a $4,000,000 order from the Government. Another of the same amount or larger is expected upon the completion of this first one. The plants of the Jackson Automobile Co. and the Mutual Motors Co. will be utilized. It is expected that production will be started within thirty days, or sixty days at the latest.

Asks Billion for Flying

Navy Wants Appropriation for Aviation in Addition to Allotment

Gasoline Shows Immense Increase in Production

WASHINGTON, Jan. 21—Major General George O. Squiers is asking Congress for more than $1,000,000,000 for aviation. This about doubles the $640,000,000 already allotted and does not include $105,000,000 which is estimated for needs of Signal Corps. General Squier explained behind closed doors the progress already accomplished and gave figures showing what the $1,000,000,000 asked for will accomplish. The Aircraft board is operated on a very efficient basis, eliminating all red tape. It spends $2,000,000 a day, yet no contractor waits more than 24 hr. for payment. Plans conceived in the morning are voted at noon and are in operation before night.

The need for the $1,000,000,000 is created by the fact that money allotted already has been converted into fighting material and the various accessories needed for the air conquest. The Government is building a factory at Vancouver barracks to be equipped for the peculiar sawing of spruce logs necessary to obtain the granted wood essential in airplane manufacture.

Plans for moving offices of the Military Truck Production Board to the Union Depot offices are abandoned. J. G. Utz, supervisor of inspection and engineering for the board, has moved, however, to engineering rooms at the Union Depot. The Military Truck Board, which now includes the functions of engineering and maintenance as well as production of Liberty trucks, is now known as the motor transport section of the Quartermaster Corps and is headed by Christian Girl as chairman.

July 13, 1917, there were 345,190,195 gal. of gasoline on hand at refineries; Aug. 31, 298,5448,699 gal., and Sept. 13, 287,758,562 gal. Lubricating oil stocks for the same periods, respectively, were 117,461,820 gal., 115,392,209 gal., and 109,528,770 gal. The total output of the refineries in 1917 up to and including September was 1,962,205,420 gal. of gasoline and 533,700,128 gal. of lubricating oil monthly production, showing that gasoline production increased each month from January to September.

The growth of the refining industry is shown by the fact that in 1916 674,842 bbl. a day were produced while in the first six months of 1917 696,106 bbl. were produced, and in the three months, July, August and September, 1917, 871,747 bbl. a day, an increase of 29 per cent over 1916.

MEN TRAINED FOR TRACTORS

Peoria, Ill., Jan. 19—The school for officers and enlisted men of the United States army, located at the Holt works, East Peoria, known also as Camp Herring, is turning out large squads of instructed men every thirty days. They are informed concerning the details of driving, repairing and constructing the caterpillar and other tractors and trucks. There are from ten to twenty officers and between 300 and 400 enlisted men here at all times.

Capt. H. T. Herring is commandant of the camp. F. L. Peterson is head instructor of the motorization school. In what used to be a large open space near the main Holt office building are two wooden structures, two stories high. These are the barracks, mess hall and kitchen. The upper stories are used for sleeping quarters. They are well lighted, well heated and are comfortable even in the coldest weather. The soldier-students arise at 5:30 a. m. and devote 7 hr. daily to the actual work of repairing and setting up motors and trucks. They are divided into squads under competent instructors and at certain times during the week meetings are held and talks heard from technical experts. The officers and enlisted men are invited to ask questions and a general discussion ensues regarding some point which had been in dispute. It is planned to instruct several thousand officers and enlisted men during the winter and every student will be in a position to go across the water, qualified to handle any kind of truck used.

BOARD FOR NEW ENTERPRISES

Washington, Jan. 19—All individuals and companies planning to begin new business enterprises during the war will have first to get the sanction of a new board of three members appointed by the President. This applies also to the issuance of stocks which before sold must be licensed by the board, which is composed of Paul M. Warburg, Frederic A. Delano and Charles S. Hamlin.

The board will deal mainly with such businesses as require large expenditures of capital while the war lasts and under its plan of formation will approve or reject issuance of securities, contracts for large constructive work and so on.

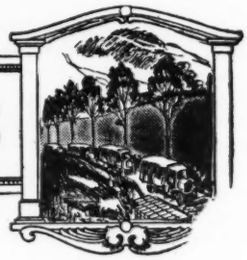
METZ PLANS PLANT SALE

Waltham, Mass., Jan. 19—The Metz company is planning to sell its plant to liquidate its debts. It will retain one part of the group of building in which it will carry on government work. The matter has been under consideration for some time and a decision was reached a few days ago. The company has some 40 acres of very valuable land, and a lot of fine machinery which should bring good prices now with the demand due to war work in New England.

WINDING UP SPRINGFIELD BODY

Detroit, Jan. 18—Barney F. Everitt, acting as trustee for the bankrupt Springfield Body Co. states that general creditors will doubtless receive 75 cents on the $1. The Detroit Shell Co. has purchased all the assets except the wood working machinery, stock on hand, accounts receivable and patents. Sale of the patents on the Springfield body to a large body maker is pending and patent litigation with the Fisher Body Corp. has been satisfactorily settled.

EDITORIAL PERSPECTIVES



The Fuel Order

WHETHER or not the Fuel Administration order closing practically all industries for a period of five days and for ten successive Mondays will achieve its ostensible object of decreasing consumption of coal in a measure which will make up for the evil effects of retarded production of war materials brought about thereby is open to grave doubt. Nevertheless, the motor industry, from a sense of duty in setting a patriotic example, universally has bowed to the order in its letter and its spirit. That an interval of less than 24 hrs. elapsed between its announcement and the time set for the order to go in force, and that, as originally pronounced, few, if any, of the war working plants were excepted, caused a lapse in production of war necessities from the motor industry which later exemptions failed to overcome.

BLACKEST among the features of the results of the order was the feeling that the actual saving in coal which could be brought about by the suspension of the motor industry was slight. Stoppage in many of the plants has given them a greater coal consumption than if they were under normal operation. In spite of its ill effects, the broad-minded men of the industry see many rays of light in the cloud of dismay caused by the proclamation, although they sincerely regret that affairs should have been permitted to come to such a pass that a step as that should have been considered necessary.

IT seems assured at this writing that, discounting unfavorable weather conditions, though the actual saving in coal may be small, the tie-up of railroad transportation which brought about the coal shortage has been relieved by the reduced transportation demand caused by the stoppage of production, so that an increased tonnage of coal may be handled by the railroads. The industry feels that, like the other big industries of the country, it has been able to assist in relieving the rail transportation system when the latter failed in a function which heretofore has been its perquisite. That the motor industry may eventually benefit indirectly by the widespread realization which the order has brought about, of the insufficiency of railway transportation, is possible. It is possible that this general showing up of the weakness of the railroads may result in more widespread use of motor haulage, particularly at terminal points, which has proved to be the neck of the bottle in this situation.

COMFORT is derived in the industry from the fact that in the coal order there is no discrimination against it. It is placed on the same basis as all other industries, and it is the first time in months that motor manufacturers have been treated the same as others. The industry will have the satisfaction of knowing that should the Fuel Administration's order achieve the results for which it was supposed to be issued, it will have taken its part in an act of national sacrifice, nationally shared and from which the nation will profit.

Chicago's National Show

WHILE the annual winter circuit of motor car shows opens with the Grand Central Palace show in New York, it is the Chicago show that really opens the circuit so far as the great attendance of dealers and the general interest of the country is concerned. The great American public is looking forward to the opening of the Chicago Coliseum show, and by the end of the show week the industry generally will have made up its mind as to an accurate estimate of public interest in the first circuit of our war motor shows.

CHICAGO always has been the great gathering ground for dealers at the show, and the coming show will not prove any exception to the rule. Naturally the number of dealers attending this year will be below last year. The very severe weather conditions and the railroad situation and the coal situation all are combining to bring this about. There are hundreds of dealers who cannot take the chance of getting to Chicago with the present uncertainty of railroad schedule but who with normal weather and normal coal and railroad conditions would be on hand. They will be absent this year, but not because they are less interested in the motor car or motor truck or the multitude of accessories but because a variety of conditions make it impossible for them to be present.

THE value of motor car shows this year cannot be based on attendance figures, and particularly on attendance figures as compared with those of a year ago. Those who are attending this year are attending because of special interest. The catalog collector is not present, due to the fact that exhibitors are not distributing admission tickets with the lavish hand they distributed them a year ago. In many cases this is due to the war tax which must be paid on such tickets. Even this, too, while reducing the total attendance, raises the general average of the attendance, in that the exhibitors and dealers will carefully pick the lists that they are sending free tickets to, rather than giving them out too freely and too carelessly as they did in seasons past.

The Post-War Car

NOW that we are in the war there will be a strong tendency to date all events from the declaration of war. Fifty years hence those of us living will divide the history of the world into two divisions—before the war and since it. This will apply to the motor car industry, and properly so, because there is not a question of doubt but that we will all have a widely improved view of the fitness of things when peace is signed and we settle down to play our individual parts in helping to recuperate the war damages.

WHEN the war is over, the motor industry will still be with us, but it will be a different industry. True, the car will have four wheels and an engine and pneumatic tires, but our mental attitude toward it will have changed. Perhaps before the war is over several of our national characteristics will have changed. Heretofore we always have aimed at having the biggest thing. The biggest idea has too often been our false god. We wanted the car with the longest wheelbase for a given price. Given two cars, one with 115 and the other with 120-in.

wheelbase, selling at the same price, we were too prone to take the 120-in. car solely because it was bigger, looked bigger and perhaps appealed to us as a better individual advertisement of our pocketbook.

WE have been too prone to buy the car with the biggest engine rather than the car with the most efficient engine. Given two cars of equal price, but one with a 350-cu. in. engine and the other with a 280-cu. in. engine, we almost invariably have taken the 350-cu. in. one because it was bigger, without ever stopping to ask how carefully the combustion chamber had been designed and finished; without carefully looking into the reputation of the maker to balance all connecting rods and pistons; and without looking into the reputation of the maker as to his care in finishing bearings, using high-grade steels and having a reputation for careful inspection of all parts entering into the car.

WHEN the war is over we will have a new attitude toward the car we are going to buy. It is more than possible that we will, to an extent, have followed the attitude of the French or British buyer of the past, who has been more interested in the maintenance cost of a car than in the first cost of it.

BEFORE the war, many of the European buyers had a certain income to live on and they could buy a car providing its cost of maintenance could practically be guaranteed. When the war is over a very large percentage of our citizens will have learned lessons of economy and of thrift. They will have learned how much science is necessary to live on a certain income, and before they decide upon a certain car it will be necessary to give them some rather definite conception of how far a set of tires will run, how many miles the car really will go on a gallon of gasoline, how many years the car will run before the main bearings of the engine have to be renewed, how many miles of travel the universal joints will stand and how many miles of travel other parts will stand without renewal.

AFTER the war the buyer will make persistent demands for service incorporated in the car rather than promises of service from the dealer who sells the car. The successful dealer should be the one selling a car for which it is not necessary to give written assurances of $50 or $100 worth of free service but rather the car that is so made that it has the service as a part of it in the form of better materials, better design, more careful manufacture of parts, very careful inspection of all parts entering into it, very careful assembly of these parts into the car and in general that care of workmanship which should be a part of any piece of workmanship. The demand for such a car unquestionably will comprise the new attitude, the post-war attitude of the buyer toward the post-war car.

Selling Farm Tractors

AN experienced farmer from Ohio recently said that he considers the selling of tractors to farmers largely a question of psychology. He describes the sales as being more a study in psychology than a question of extracting a certain amount of money from the farmer in return for a certain combination of machinery that can be used on the farm.

TO-DAY too many farmers have the wrong mental conception of the farm tractor. They look upon it in much the same mental attitude as they look upon a plow, a set of harrows, a seed drill or a farm wagon. They are not yet thinking in tractor channels. They are not yet thinking in channels of fine workmanship and high-class engineering necessary to make an efficient tractor engine or to make an efficient transmission system in a tractor. Too many farmers consider the heaviest and biggest tractor the only satisfactory type. They think that weight is a prime essential in order to get sufficient traction to move over the farm land. They look upon huge cylinders as the only means of getting the necessary power.

THIS mental attitude of the farmer toward the tractor goes still further. He thinks that anti-friction bearings are all right for a motor car but are not needed for a farm tractor. He thinks that alloy forged gears are a necessity in a truck but not in a tractor. He thinks that inclosed parts are essential in a truck but not essential in a tractor to work in a dusty field. All through he has the wrong mental attitude. This mental attitude has been built up during generations of farm life. It is a mental attitude that has been built up around the horse as the available power for farm work. Every phase of this mental attitude goes back to some phase of horse work. The horse is the center of this mental condition. The thought of horse accomplishment, and horse possibility of accomplishment, ramifies through every fibre of the farm tractor domain.

THE farmer must develop himself into an international attitude. He must think of the 160 acres of his farm and what they can produce, not in the single narrow thought of what they can do for himself, his wife and children, but what they can do for the entire world. The farmer in his relationship to others in the world must ask himself the pertinent questions: "Can I afford to use horses when I can use motor tractors? Can I afford to use horses that consume the produce grown from many acres of my farm when I might use the motor tractor that takes its food from the bowels of the earth? Can I afford to use horses when I can secure motor tractors with which one man can accomplish immeasurably more than he can accomplish with a team or two teams of horses? Can I afford to use horses that cannot do good deep plowing for winter wheat in the hot summer months when such should be done, when it is possible for me to buy tractors that can plow to advantage in those months? Can I afford to keep on using horses that cannot do all of the late fall plowing I need when with tractors it is possible to do such work?"

PERHAPS the mental attitude of the farmer might be analyzed still further: Has the day arrived when each farmer cannot do just what he would like to do just as he would like to do, any more than any soldier can act just as he would like to act in our army? Has the day arrived when farmers may in response to national demands have to increase greatly the productive capacity of each acre? This has really happened in France and England, and when we have been three years or perhaps more in the present war it may be essential that we have to do the same.

WE may analyze still further this mental attitude: To-day a farmer, at least too many of them, seems to have the impression that a piece of farm machinery was made to stand out all winter and rust into uselessness. It would be very amazing if our Government did not step in and demand that every piece of farm machinery be housed properly and cared for as it should be. Every time a piece of farm machinery is allowed to rust into uselessness the labor forces of our country are being wasted. Every time a piece of machinery is made useless by that carelessness it means a new piece must be made. Manufacturing that new piece calls for more iron, which is scarce. It calls for more coal, which is very scarce just at present, although there is enough in the earth in this country alone to run us for 2000 years. That new machine calls for more labor and labor is growing scarcer.

Effect of Industry Shutdown

Makers of Motor Cars and Allied Trades Acquiesce in Fuel Order Calling Halt in Production, but Doubtful of Saving Very Much Coal

THE motor car and allied industries, recognizing the seriousness of the fuel and transportation situation which brought it about, are, from a sense of patriotic duty, living up to the spirit and the letter of the Fuel Administration order, but with grave fears that in spite of the hundreds of thousands of men thrown temporarily out of work, and in spite of the temporary reduction of necessary war production, very little coal actually is being saved. The situation is deplorable, the remedy little less so, but patriotism requires and obtains acquiescence.

MANUFACTURERS and dealers throughout the country, without exception, have obeyed the edict of the Fuel Administration to close down their plants and salesrooms on the five heatless days and the ten heatless Mondays ordered. The only plants or portions of plants operating during these days, a careful canvass shows, are those engaged in war work and specifically exempted therefor.

Dealers' salesrooms are closed and service stations are open only as the local fuel authorities specify.

Added to the fact that order for the closing of all industries came hours and, in some instances, days before the exemptions of plants operating on war work and therefore resulted in seemingly unnecessary temporary stoppage of most important work on war necessities, is the fact that exemptions in some cases came from Washington and in others from the local fuel administrators of the various states, which neither agreed with the federal rulings nor with each other. An example of the latter case is that of the tractor industry, which in some states is permitted to operate and in others is not.

Helped Transportation

The industry as a whole probably has not added greatly to the fuel supply, but probably through the stoppage of production has helped reduce transportation demands to permit the handling of increased tonnage of coal by the railroads. In other words, the motor industry, like the other big industries of the country, has been held up to relieve the rail transportation system when it failed to meet the demand.

The general attitude of manufacturers is expressed in the words, "As patriotic citizens we must obey the edict of the Government regardless of our personal opinions." The factories at once closed down, some of them operating a short time Friday until the order was recognized as being authoritative. Friday night telegrams were sent out to plants engaged on war contracts, but these were received too late in most instances, with the result that many had a hard time getting their organizations together Saturday to go on with the work.

Probably most of the criticism directed against the order is because the exemption list did not come with it. It is recognized that the order had to be given suddenly, because if it were not manufacturers would have started protecting themselves by rushing shipments and other means, which would have resulted in a worse tie-up than now exists. In the meantime manufacturers are obeying the orders, hoping that the Fuel Administration really accomplishes something by its drastic measures, but not seeing how this is to be done.

Automotive products covered in the plants exempted in a list prepared by Secretaries Baker and Daniels included aircraft and aircraft parts, Signal Corps equipment, electrical supplies and certain tool steel work. It is necessary to heat the plants to save them from destruction by freezing and this takes a large percentage of the coal ordinarily consumed. In some of the big plants not over 10 tons a day is being saved by the order.

Were the power taken by the motor car and parts factories all saved in the form of fuel, the saving would be much greater than it really is. Many of the concerns operate on by-products of their factories; others use water power. Wood waste in many factories serves as sources of heat, light and powers; others use exhaust steam and still others use the power developed by their machines on test and being run in. Some of these actually furnish to the territory in which they are located surplus power from this latter source that is above their needs.

Effect in Michigan Plants

Detroit, Jan. 21—Detroit has settled down to its jobless days. There is a fair amount of discontent among the workmen temporarily out of employment, although this is of a resigned quality. The exemption situation has about cleared up, so that men working on munitions contracts and other kinds of work important to the Government are back at their places. Factories which have some of their departments under operation are Cadillac, Buick, Ford, Packard, General Motors, Lincoln Motors, Fisher Body, which are working on airplane materials; General Aluminum & Brass, Detroit Copper & Brass, American Car & Foundry, Dodge Bros., Studebaker, Zenith Carbureter, Maxwell Motor and Continental Motors, which are working on other munitions.

About 75 per cent of Detroit industries were shut down Friday and on Saturday morning virtually 90 per cent of the city's industries adjusted themselves to the schedule imposed by the fuel regulations.

The Willys-Overland factory at Toledo is closed, except in the departments doing Government work. The Elmira plant is running night and day and the Elyria plant is also going ahead with its airplane work. The number of men laid off by the Willys-Overland Co. is 8000. The coal saving of this company amounts to about 200 tons a day.

Practically the same conditions apply to the Buick company in Flint, where all but the aircraft men are laid off, making a total of about 12,000 employes out of work for the five-day period. This company uses normally 600 tons of coal a day, of which 42 per cent will be saved through closing.

The Ford Motor Co. started Monday operating in the departments where Government work is under way, the most important of this being the department concerned with the manufacture of cylinders for the Liberty aircraft engines. This highly important work was closed down with the rest of the factory because the Ford company did not get its exemption order until late Friday night, when it was too late to get the force together to start work again Saturday. In saving of coal the five-day shutdown of the Ford company will mean about twelve carloads or fifteen carloads a day. The normal consumption is from seventeen to eighteen carloads a day.

The number of men thrown out of employment in Detroit alone is approximately 200,000. These men will not be paid during the lay-off period so far as is known.

Situation in Mid-West

Chicago, Jan. 22—The tractor industry in Illinois is the only portion of the motor industry whose commercial manufacture is not greatly restricted in this territory by the heatless days of the national Fuel Administration order. According to an exemption ruling of the state fuel administrator Saturday manufacturers of farm implements and agricultural tractors in the state are permitted to operate without interruption during the remainder of the five heatless days and on the heatless Mondays as long as production is confined to orders for spring delivery.

Inasmuch as all the more important tractor makers in the state have orders for spring delivery far ahead, the new ruling will permit them to resume operations

which have been suspended since yesterday. The Parrett company has been working nights to keep up production for spring orders.

So far as known now, tractor makers in other states are not so fortunate. In Wisconsin the state fuel administrator has not exempted the implement and tractor men. The J. I. Case T. M. Co. at Racine, Wis., one of the biggest farm implement and tractor manufacturers, as well as being a car builder, has closed down completely, so far as work inside the plant is concerned, and will remain so till Wednesday and on the following nine Mondays unless a ruling is received to the contrary.

The instance of the Case T. M. company is typical of larger concerns in many industries. This concern, though it is not making anything directly for our Government, is making the machines which increase the production of foodstuffs. Also it making thousands of tractors for the governments of our allies. At this time it is sending 700 carloads of tractors to Europe. Its 4500 men are idle, except those who can be used in clearing away snow and loading and unloading cars on its sidings.

Plant Conditions Vary

Car and truck manufacturers who are not doing any Government war business are shut up completely. Many of the concerns in this territory, however, are doing some Government work on war materials, trucks particularly, and are operating those portions of their plants devoted to the production of war orders.

The remainder of their plants are closed and the temperature kept only high enough to prevent freezing water pipes, etc. The Nash Motor Co., which is making war trucks, is operating the part of the plant solely devoted to U. S. orders and has closed the rest. The Velie company is doing likewise, though 800 of its 1200 men will be idle during all the heatless days. Root & Vandervoort of Moline, makers of the Moline-Knight, are devoting 85 per cent of their facilities to war work. Nevertheless they are closed down completely, with their 2000 men idle, and will remain so throughout the heatless days, unless they receive exemption orders. Studebaker is operating its Detroit plants on Government work. The South Bend works are closed, although they have some Government work on hand.

Conditions throughout Indiana seem to be about the same as in Illinois. Nordyke & Marmon Co., which is making aviation engines, is exempted by national order. Premier is making war trucks and probably will be permitted to continue their production.

The general feeling among the manufacturers is that while they may doubt the wisdom of the particular method employed by the Government to relieve railroad and terminal congestion and the coal situation, that situation is one which needs relief. Above all, they all evince a spirit of willingness to abide by the spirit and letter of the order and bear whatever burdens may be imposed for the benefit of the cause.

How Chicago Dealers Meet Problem

A similar spirit actuates the dealers in Chicago. The motor trade in this city comprises three divisions of the industry: sales, manufacturing and service. Some of the institutions comprise two and some all three of these divisions and the Chicago Automobile Trade Association has had a knotty problem to unravel. Its problem was to arrive at a policy for its members which would be within the letter and spirit of the ruling and at the same time not jeopardize the distribution of fuel and food by refusing service to trucks engaged in that work.

After an almost continuous session since the publication of the order, the officers of the association suggested the following policy, which meets with the approval of national and state fuel administrators:

Retail and wholesale rooms close Mondays and all fuelless days. Service departments close Mondays, open for service Tuesday. No service to anyone on Monday. Service to anyone asking it on other days. Can make no new parts. As little heat is needed, temperatures will be kept low on heatless days.

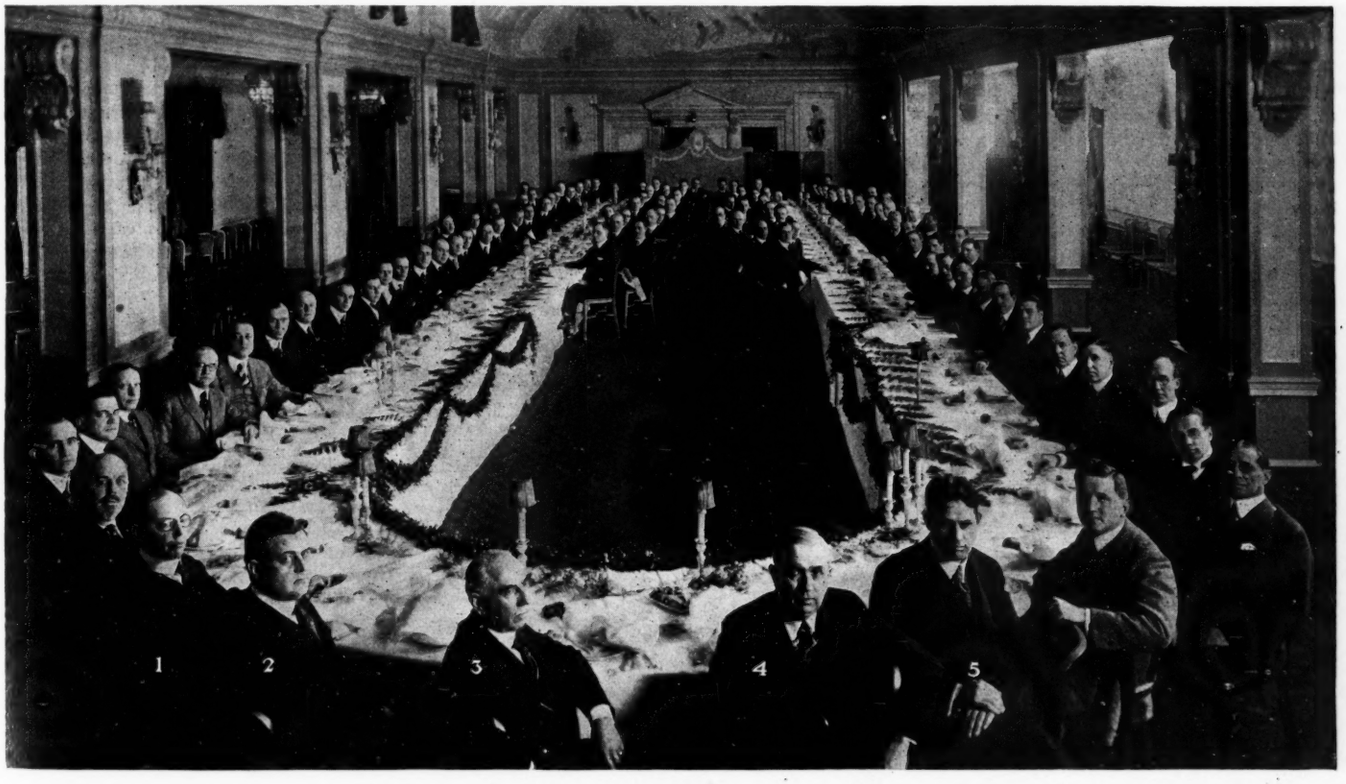
Practically everything on motor row was closed Friday and Saturday pending definite rulings from local authorities. These were obtained when the dealers refused to give service to anyone without a special order from the fuel administrator.

On the whole, Mondays will be the same as Sundays on motor row for its 12,300 people.

Heatless days are heatless days in Chicago with the thermometer ranging from 14 below zero Friday to 18 above today.

Gotham Dealers More Liberal

New York, Jan. 19—New York dealers decided that during the five-day period, with the exception of Monday, they would shut down so far as possible. They would use no more elevators than were absolutely necessary for getting cars in and out of



Part of the Class Journal Co. organization which gathers each year during the New York show. Those with numbers are: (1) E. M. Corey, treasurer; (2) W. I. Ralph, vice-president; (3) H. M. Swetland, president; (4) A. B. Swetland, general manager; (5) David Beecroft, directing editor

service station; they would cut off heat wherever possible and to as low a degree as possible and would cut down light as far as possible.

Dealers in Philadelphia curtailed there as far as possible, but nevertheless kept open; everywhere, however, dealers agree that it will be necessary to almost close up on Monday. Several shows come within the restricted period. The Philadelphia show is being held as usual, the only large show that has been called off being that in Rochester. This show has been abandoned.

Boston Dealers Peeved

Boston, Jan. 19—The Boston motor car dealers, particularly the used car men, and the accessory and tire people are not at all pleased with the order declaring every Monday a holiday for the next ten weeks. Many of the dealers take advantage of the advertising in the Sunday papers and look to do business on Monday. And they have been in the habit of keeping open on holidays such as Washington's Birthday, Columbus Day, etc., so that to close now on Mondays will be a hardship upon them. This is particularly true of the used car dealers. Monday is generally their big day following the Sunday advertising. The fact that they must not open until 9 and must close at 5 every week day here is also an added hardship. And on top of this will be the closing of the motor show on the first Monday of show week here.

Show Circuit Affected

The National motor car show at Chicago will open next Saturday but will be closed both Sunday and Monday, Manager Miles refusing to take advantage of a suggested possibility of classification among theaters, etc., which would permit him to close Tuesday instead and thus catch the Monday crowds.

Buffalo will open as usual and run for the full week. Baltimore, Cleveland, Allentown, Pa., Kansas City, Bridgeton, N. J., will open the shows on the dates. In Scranton and Harrisburg the shows which were scheduled to open on a Monday will not open until Tuesday. In York, Pa., the show has been postponed.

(*Concluded on page* 71)

BIJUR MEETS TROUBLE

New York, Jan. 19—The Bijur Motor Lighting Co., Hoboken has been placed in the hands of receivers. It is understood that the action has come as a result of a lack of ready cash with which to carry on certain Government work. Liabilities are placed at $1,250,000 and assets at more than $2,000,000. E. Bright Wilson, Joseph Bijur and Louis V. Hubbard are receivers.

ROSS PLANT IS SOLD

Detroit, Jan. 17—The plant of the bankrupt Ross Automobile Co. has been sold to the Shiffman Iron & Metal Co. by Barney F. Everitt, trustee. It is stated that the factory land brought $180,000, and this together with the subsequent sale of the Ross car is expected to permit paying the creditors 100 cents on the dollar. The Fisher Body Co. has leased the plant and it will be used for the manufacture of small hardware for bodies and airplanes. The Fisher Body Co. is entering extensively into airplane manufacture.

Tractor First in West

Must Precede Truck to Make Highways Through Which Sales Come

Hardware and Implement Dealers Discuss Types

KANSAS CITY, Mo., Jan. 19—Exceptionally cheerful views of the motor trade were taken by members of the Western Implement, Vehicle and Hardware Association who attended its annual convention here Jan. 14 to 19. Many members are motor car dealers and a greater number handle tractors. Another large per cent is going in for motor truck sales. The latter is particularly true of those dealers who are located in the dairy sections of Missouri, Kansas, Oklahoma and Texas.

Implement, vehicle and hardware dealers who were interviewed said that dairying follows the construction of permanent roads. It takes tractors to build permanent roads efficiently, so the construction of permanent roads in these states means tractor sales for the dealers and ultimately motor truck sales. Motor car sales are increased with the construction of permanent roads.

Demand for the smaller or purely agricultural type of tractors is growing. Strides made by manufacturers towards standardized types have benefited the dealers who handle them and have simplified the problem of sales and service. In the strictly wheat belt of Kansas the demand is still strong for the 30 and 60 hp. tractors, the same type that is being utilized in permanent road work. In the corn belt section the demand for tractors is confined to the 8-16 and 10-20 types. The motor cultivator has established itself as an efficient and highly useful farm implement in the cultivating of corn and trade in this line of tractor activities promises to be good, particularly in view of the shortage of man power on central western farms coupled with an equal shortage of horses.

Simplified lubricating and ignition systems have also aided in tractor sales and have reduced the service that the dealers have been compelled to give the farmers who have purchased tractors in the past. A tractor stalled in the field or broken down in the field means a trip to the country for the dealer. A motor car or truck may be taken to town for service but it is a case of taking Mahomet to the mountain with the tractor when it gets out of action. Dealers are not offering service as a sales inducement but all of them are giving service.

More dealers will stock tractors this spring than ever before as they prefer to sell from the demonstration tractor rather than from catalogues. In addition to this phase of sales they prefer to take the discount given for sales to the dealer rather than to take the commission that goes to the dealer where the sale is made through a traveler representing the manufacturer through a branch or distributing house who works the prospect for the dealer. In this way there is a better profit for the dealer. The motor car sales plan has encouraged the implement or hardware dealer to stock tractors. He can readily see the commercial aspects of stocking tractors outright and takes advantage of the profit that accrues to him through purchases from the manufacturer.

These implement and hardware dealers who are now selling cars propose to turn the activities now exerted in motor sales to the sales of tractors and motor trucks in the event that passenger cars come under the ban through the exigencies of war. Many of the implement, vehicle and hardware dealers have large motor car repair shops in connection with their implement businesses.

Opinions of implement men who are dealers are enlightening. People will take better care of the passenger cars, one predicts, when they find, if they do, that new cars are not to be had because of war conditions and the diversion of materials to other lines, among which would be tractor and motor trucks. To maintain their cars now owned it will be necessary, he says, to keep them in the best of repair so as to prolong their usefulness to the maximum. Another, who has had a vast experience in the handling of cars and trucks said that motor car dealers will naturally turn to increased motor truck and tractor sales in the event that cars for passenger purposes come under the ban because of war conditions. He predicted a largely increased business for the repair shops and cited the immense amount of shoe repair work that is being done by every cobbler now that shoes have advanced so much in price as to make their longest possible utilization imperative.

Dealers Backing Movement

Dealers everywhere are behind the movement to have all tractor and motor truck as well as farm implement users, to take an immediate invoice of their repair needs so as to get these repairs made up and in the hands of those who will require them at the very earliest moment, so that the repair department activities of all the big manufacturing concerns in the motor, and the implement and farm machinery business as well, may be released for war activities. Time for all concerned will be saved and the work of planting and tilling expedited by farmers and truck men having all their farm machinery repaired and ready for work as soon as the farming season opens.

Many counties in the Central West are rushing to avail themselves of the federal aid for road work that they must utilize soon if they are to have it at all. This means increased tractor sales for dealers in the communities where these permanent roads are to be constructed with federal aid.

Unprecedented prosperity in the Central West, caused by larger crops, in most instances, and in greatly increased prices for all crops produced in 1917, gives the farmers greater buying power for tractors and motor trucks than ever before. Greatly increased acreages of winter wheat have already been achieved. Corn and oat acreage will be increased over 1917 and this means that more work must be done by

fewer men and fewer horses than in 1917. While many of the larger dealers stated that they preferred to stock tractors and pay for them in the regular commercial way, yet the resolutions adopted by the convention stated that it was not the opinion of the convention as a whole that the distribution of tractors would be augmented and furthered if dealers were not required to make a deposit on tractor purchases.

The convention also expressed itself, through the resolutions adopted, as being in favor of "Repair Week" and the executive committee was authorized to designate some week in February as "Repair Week," when every dealer will urge on his customers to invoice his repair needs and have the dealer put in an order for them immediately. The purpose of this plan is to prevent any transportation delays and to secure maximum car loadings of repairs to branch and distributing points from where the repairs will be sent out to dealers, as well as to give the factories a chance to get these repair parts out of the way and then turn to military activities. Col. W. E. Lilly of Ochiltree, Tex., who is an extensive ranchman as well as implement, vehicle and hardware dealer, said during the convention that the tractor must precede the motor truck in that country. Livestock is often hauled to market or to shipping points a distance of 20 to 60 miles. This hauling of livestock is done with 6 horses and a huge wagon with a trailer. It would be impossible to change these wagon drivers off directly to truck driving. The tractor is an absolute essential in the voluminous farming in the section where vast areas are plowed and cultivated.

The motorization of Texas farm activities must come, Col. Lilly said, through tractor driving which has come to be a principal element in farm work and crop production while motor truck driving is an incident attendant on production through motor cultivation, motor trucks being used as a marketing factor after the prime factor of farm work, that of production, has been accomplished.

Wants 7000 Mechanics

U. S. A. Needs Men for Early Service in France with Aviation Section

Call for Skill in Repair and Maintenance Depots

WASHINGTON, Jan. 18—Seven thousand mechanics are required for early service in France by the Aviation Section of the Signal Corps, the urgency being such that these should leave for France about February 1. Previous to leaving for France they will undergo a short preliminary training at Fort Hancock. The men are required for various mechanical lines and will be organized Jan. 16 into four regiments. Those eligible for enlistment must be outside of draft ages, and the ages desired by the Signal Corps are 18 to 20 inclusive and 31 to 40, inclusive.

Of the total 7000 approximately 3500 mechanics familiar with gas engine repair, etc., are needed. In addition the classification of men follows:

Automotive mechanics	3500
Ignition men	300
Truck drivers	194
Blacksmiths and forgemen	220
Canvas workers	100
Cabinet workmen	500
Cooks	200
Harness makers	20
General mechanics	400
Lathe men	160
Machinists (planers and millers)	116
Tool makers	640
Sheet metal workers	460
Wheelwrights	220
Welders	80
House painters	40
Sign painters	40

In the organization of these men into regiments the classification is an follows:

Master signal electricians	82
Sergeants, first class	522
Sergeants	1806
Corporals	2064
Privates, first class	2024
Privates	504

The pay for these different classifications covers a wide range. The faster signal electricians receive $87 per month, and with allowances for dependents reaching $129.70. The pay for sergeants, first class, is $53, which, with allowances, reaches $96. The sergeant's pay is $44, which may reach $85, with allowances; for corporals, $36 and to $75 for allowances and for privates, $30 to $68.50 for allowances.

All men enlisting will have to do so through local recruiting offices which are scattered over the country.

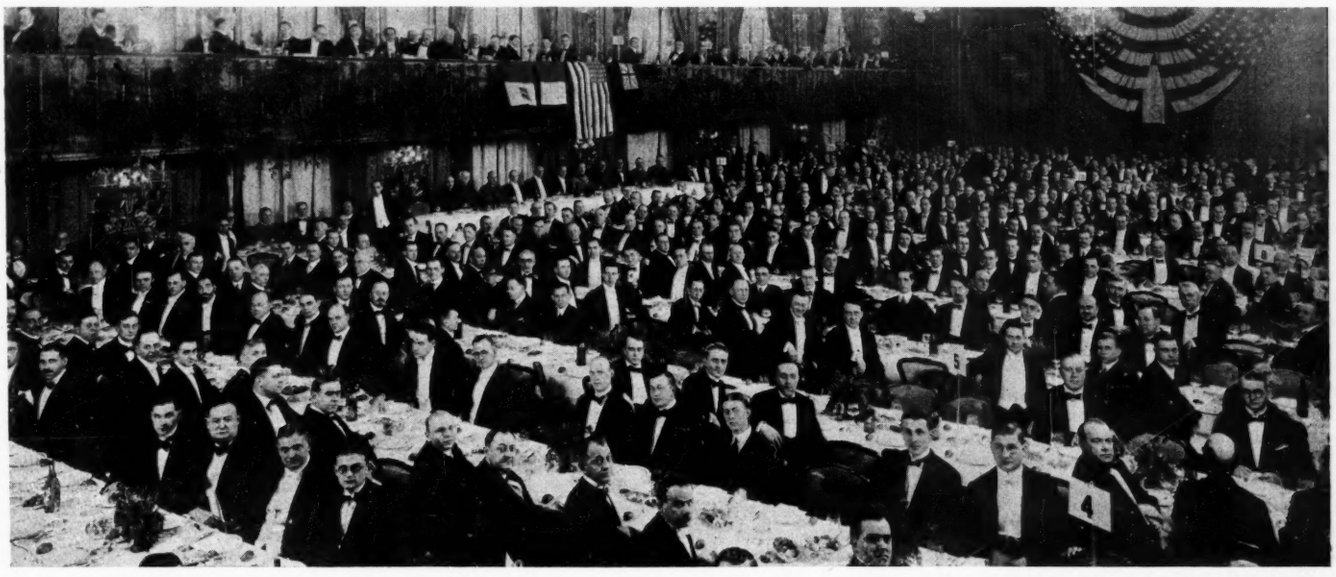
This call for skilled workmen offers a very useful field for those desiring to get into this work in France. Undoubtedly these workers will all be located in the great repair and maintenance depots to be established back of the lines in France.

DISCO STARTER IN NEW HANDS

Detroit, Jan. 17—The Disco Electric Mfg. Co. has taken over the bankrupt Disco Electric Starter Co. and is starting in on the extensive manufacture of the Disco starter for Ford cars. New capital has been obtained, and the personnel of the present company is entirely new, the name being all that is carried over from the former company. Dean Emerson of the Wagner Electric Co. is general manager and Harry F. Prescott, formerly with the Saxon Motor Car Corp., is sales manager. The new building occupied by the former company for a short period is being used and the company is in postion to manufacture practically any kind of electrical equipment for the motor car and will doubtless enter this field soon.

MILLER AS STOCK EQUIPMENT

Los Angeles, Cal., Jan. 22—Miller carbureters have been adopted as standard equipment on all models of the Diamond T motor trucks. Two makes of passenger cars also have adopted the Miller carbureter on their entire equipment for the present season, these being the Wolverine Motor Car Co., Kalamazoo, Mich., and the Comet Automobile Co., Decatur, Ill.



Banquet of the Rubber Association of America, which was held in New York during show week

Victory With Truck as Aid

N. A. C. C. Pledges Co-operation With Government and Urges Necessity of Aid From Truck Makers and Users in Relieving Railroads

"THE automobile industry is more interested in having democracy as usual after the war than business as usual now."

"The truck has now come to the point of being a National necessity."

These two remarks, the first by Hugh Chalmers and the second by H. L. Horning, give the theme of the convention of motor truck manufacturers at the board room of the N. A. C. C. in New York during show week. The keynote of the meeting was service to the Government. About 100 of the most prominent truck makers of the country attended. Co-operation with the Government motor truck program; assistance in relieving the railroad congestion by the use of motor trucks and additional services possible by the motor truck industry were considered.

George M. Graham, assistant commercial manager of the Pierce-Arrow Motor Car Co., Buffalo, N. Y., outlined the work the motor truck industry already has rendered to the Government and told of the work done by trucks with General Pershing's expeditionary forces in Mexico, tracing the industry's work from that time up to and including the many weeks of effort in the development of the standardized motor trucks.

Truck Must Prove Worth

The great problem now before the motor truck industry is to prove the feasibility and practicability of employing the motor truck to relieve the acute railroad congestion which is bound to increase as our rolling stock wears out through lack of proper care and as our Government's preparation increases to keep our army of one million men supplied 3000 miles from their base.

Major Edward Orton, Jr., Q. M. C., U. S. A., told of a great work which the Government is now doing in driving its standardized war trucks and other trucks still being shipped on previous orders overland from their points of assembly to the seaboard. He pointed out that the most important efforts of these overland driveaways of war trucks are not in the 15,000 freight cars saved for other needs or for the 100,000 tons of freight which they will carry, but instead are the great educational value which these long convoys of trucks will have upon the people of America to make them wake up to the fact that we are really at war.

These trucks will be the first physical contact which a large proportion of our citizenship has had with the materials of the war. We have not yet been bombed by enemy airplanes, nor have our coasts been shelled by the guns of great dreadnoughts lying out of sight of our coast behind the horizon. These war trucks will be one of the first object lessons of the war and of the great preparations which our officials in Washington are making to assure a victory for our arms.

Delays in mail due to the severe snowstorms that tied up traffic in general and set all Chicago, for instance, to digging trenches in the snow, has prevented the publication of this report in its complete form until now.

The second great benefit of these driveaways will be the bringing to the citizenship the great necessity for overland motor routes and roadways capable of withstanding motor truck traffic and of roads which actually lead somewhere and do not branch out to obscure points, as have been caused by the individual road-building programs of our several states. This need has long been in existence, but it will be the lesson taught by these war trucks that will bring it to the fore and result in the great development of our national highways. These great driveaways of our 30,000 or more war trucks will have a bigger immediate military advantage than a commercial one. This will be in the training of the great personnel of truck drivers, truck masters and mechanicians required to keep our trucks in motion.

Major Orton told of the many months of study which were necessary before the first driveaway was accomplished. He told of how engineering reports on the roads had to be obtained; how routes had to be selected; how road maps had to be secured from the topographical departments of the several states through which the route led; of building gaps in the proposed road; of repairing such parts of roads selected as were impassable for trucks; of the co-operation which had to be expressed by the state highway departments of the various states to keep the route clear of snow during the winter months and of the necessity of supplying doctors, kitchen equipment, oil-filling stations along the route, sleeping quarters and a plotting of the various truck assembly plants and their relation to the main cross-country route.

Major Orton mentioned the great detail work which had to be completed successfully in getting the freight which the trucks will carry to the proper points so that it might be loaded into the trucks. It was also necessary to see that this freight was of the proper kind, size and nature that it could be economically loaded into the prescribed motor truck bodies. He then told briefly of the plans of the Government for training the drivers of these trucks. He mentioned the possibility of seriously damaging the trucks if run overland by green or inexperienced drivers, and was of the opinion that the Government's eventual policy would be to have a green crew act as observers along with a trained crew on one trip and then to let the green crew take out a new fleet on the second trip. In this way, he pointed out, the trucks would be much less liable to be damaged while under the eye of an experienced driver on the seat of each vehicle with the novice. At the present time the personnel for twelve motor truck companies of thirty-three trucks each has been drafted from the various cantonments for the work. Undoubtedly others will be selected as soon as the standardized war trucks begin coming through in quantity.

David S. Ludlum, president of the Autocar Co., Ardmore, Pa., spoke of the necessity of establishing schools where motor truck drivers could be trained instead of trying to give them training for a few hundred miles in the overland driveaways. He brought out the fact that the purchase of motor trucks would mount into millions of dollars and that it would be folly to entrust this vast i vestment to the hands of unskilled men who might abuse the trucks by their inexperience. He also spoke of the fatality of one of the truck drivers on the Packard train which left Detroit Dec. 14 and arrived at Baltimore Dec. 28. Although one of the rules which every Army truck driver must learn is that he must bring his truck to a stop before crossing a railroad track to see if the way is clear, one of the truck drivers was struck by a locomotive on the trip while passing through Warren, Ohio. The truck driver was killed and the truck demolished. Mr. Ludlum brought out the fact that this accident occurred at 2 a. m. and was of the opinion that no night driving should be permitted on the overland driveaways unless each driver had received a sufficient amount of actual road driving previously. Even then he thought that 10 hr. continuous driving was all that should be required of the new drivers now.

Appeal by Chalmers

Hugh Chalmers made a great appeal for a better understanding of what the war really means to the passenger car and motor truck industry. He briefly sketched the work of the Automobile Industries Committee in Washington and how it was partially instrumental in blocking the proposed curtailment of the industry because of the misinformed assumption that it was a non-essential. He stated that there would be no official curtailment of the motor car industry except in so far as the question of materials arose.

Mr. Chalmers stated that the citizens of the United States will have to meet several great shocks in the near fuure. The industry will have to meet these shocks as well as the other great industries of the nation. He told of a recent movement in Washington to cancel the New York and Chicago national shows to save railroad transportation and coal with which to heat the show buildings. It was partially due to the work of his committee that these movements were sidetracked. He pointed out that of all years in the history of the industry, 1918 was the one year in which

the shows should be continued, in order that the necessary readjustment between the passenger car maker, his distributor and his dealer might be met effectively and that the calling off of the shows at this time would entail a great financial loss of thousands of dollars due to previously arranged contracts and preparations.

H. L. Horning of the automotive section of the War Industries Board pointed out that the motor truck has the greatest chance for development in the history of the industry. He pointed out the possible use for from 100,000 to 300,000 motor trucks in the parcel post delivery system of this country and said that it was necessary for motor truck manufacturers to get behind legislation in Washington to make this possible. With the use of motor trucks in this work made possible through Government legislation, the various truck companies would advance the idea of the necessity of the motor truck much more rapidly than they would if they should first try to sell their trucks separately to the Post-office Department. It was also his opinion that the motor truck has not yet been sold to the country at large, and that the surface of the possibility of motor truck use has only as yet been scratched.

Over-production of Fuel

One of the startling statements made by H. L. Horning was to the effect that there is an over-production of gasoline today of more than 1,000,000 gal. a day.

Mr. Horning, in his official capacity in Washington, already has been in receipt of many inquiries from motor truck manufacturers as to obtaining priority orders for the shipment of goods entering into motor truck manufacture and brought out the fact that notwithstanding that these makers have A1 priority orders, they could still not get materials. In his opinion, the remedy for this difficulty lies in the motor truck establishing its status as a national necessity. If motor truck makers can prove to the Government the necessity for using more and more motor trucks to relieve the freight congestion and can actually relieve it, the status of the motor truck will become firmly fixed and there will be no question as to the various makers not getting sufficient material to produce their vehicles. He further pointed out that the motor truck is the means whereby our armies in the field can strike the blows which will result in defeating the Germans. The trucks carry the ammunition, the food and all sorts of military supplies, without which these sledgehammer blows cannot be given.

The need for a Federal statute controlling the operation of motor trucks in every state of the Union was the outstanding feature of the talk given by Windsor T. White, chairman of the N. A. C. C. Commercial Vehicle Committee, on "Legislation Affecting the Use of Motor Trucks." Mr. White's paper treated of the present non-uniformity of existing laws regarding the operation of motor trucks, and the fact that a truck owner operating his vehicle in more than one state would have to equip his trucks with different sized tires if the various laws were carried out to the letter. In some cases the trucks which could be operated in one state could not be run in another on account of the difference in the existing laws.

S. M. Williams of the Garford company, Lima, Ohio, made an appeal for the immediate building of national highways suitable for continuous motor truck traffic. These roads will have to come first because our present thoroughfares are not able to withstand the greatly increased amount of freight which trucks will have to carry over them within the next year.

J. F. Winchester, secretary of the Motor Truck Club of New Jersey, told of unfair laws controlling the operation of motor trucks in his state, and of how from 60 to 70 per cent of all the trucks operating in New Jersey at the present time will be barred if the new law were inforced to the letter. He brought out the fact that according to the present law, which went into effect Jan. 1, 1918, 5-ton trucks, such as the Pierce-Arrow, Packard, Mack and others which carry over 66 per cent of their total load on the rear wheels, would not be allowed on the road if the present reading of the law that not more than a third of the total weight be carried on any one wheel were enforced strictly.

Roy D. Chapin, chairman of the Highways Transport Committee, told of the great need of transportation to win the war. He mentioned the inadequacy of our present rail, inland water and ocean transportation and of the great possibility of motor truck haulage provided suitable roads were built and properly maintained.

The reliance which the Government departments are placing on the motor trucks was brought out by a request made to the Highways Transport Committee by the Shipping Board that the war trucks driven overland carry parts of ships now urgently required at the yards along the eastern seaboard. The work which trucks can accomplish in relieving the present terminal congestion also was discussed, and the necessity for good roads kept opened all the year around made evident the trucks were to succeed in this important work.

Return Loads Necessary

The problem of return loads must be s lved if the trucks are to operate at their maximum efficiency. Mr. Chapin told of the plan now being introduced in Connecticut, in which a Return Loads telephone number is placed in the telephone directory of each city. Then if a driver carries a load from one city to the other, all he has to do is to call up Return Loads in the city to which he has driven and inquire if there are any loads to be returned to the city from which he has come.

George H. Pride, also a member of the Highways Transport Committee and himself an operator of a large fleet of motor trucks, told of the possibility of motor truck use in emergencies where time is paramount; in the delivery of express material; in the haulage of high grade or high rate L. C. L. freight shipment; of the possibility of eliminating grating when goods are hauled by trucks, and of combined long inland water way hauls by garages and short motor truck hauls at each

The Platform of the N. A. C. C. Truck Makers

1—RESOLVED, *That the motor truck manufacturers of the United States, in convention assembled in New York on Jan.* 8, 1918, *hereby tender to the President of the United States, to the Secretary of War and to the Council of National Defense, their services and co-operation in meeting the transportation needs of the Government and the country, and offer the facilities of their factories to aid in the prosecution of hostilities against the Governments of countries with which the United States is at war. It is resolved, That copies of this resolution be addressed to the President and the Secretary of War.*

2—WHEREAS, *The present unprecedented crisis in the railroad transportation service of the country has made imperative an extraordinary development of motor trucking by highway to meet the needs of the War Department of the Government and of the industry and commerce of the United States, and*

WHEREAS, *It is essential to the effective use of motor vehicles as a measure of relief of freight and express congestion that the main highways be put and kept in good usable condition for the movement of the products of farm and factory, it is*

RESOLVED, *That the Director-General of the Railroads be urged to raise the embargo against the use of open-top railroad cars for the shipment of road materials and machinery in sufficient time to permit of resumption of highway construction and repair early next spring in the northern states and, if conditions permit, that this portion of the order be rescinded this winter in so far as it affects the southern states and California.*

3—RESOLVED, *That a committee of five representatives of motor truck manufacturing companies be appointed by the president of the National Automobile Chamber of Commerce to co-operate with and assist the Highways Transport Committee of the Council of National Defense in working out problems arising in connection with the organization and development of transportation by public highway for the relief of railroad freight congestion and to facilitate the movement of military trucks and the transportation of the mails.*

4—RESOLVED, *That the representatives of motor truck companies in attendance at this convention indorse unanimously the work and plans of the Highway Transport Committee of the Council of National Defense and hereby tender the full co-operation of the motor truck industry in developing ways and means for increasing the effectiveness of the motor truck in moving merchandise and other freight and express matter.*

5—RESOLVED, *That the motor truck manufacturers of the United States, assembled in convention Jan.* 8, 1918, *who view with increasing apprehension the various forms of drastic motor truck legislation already passed and other forms threatened, hereby appeal to the Council of National Defense, asking the council to request the various states in this time of stress, when transportation is the need of the hour, to refrain from passing or enforcing any unreasonable legislation that would interfere with motor truck transportation.*

As far as possible tools, jigs, etc., are to be limited to three sets on all major units and less on minor units and the Quartermaster Corps reserves the right to direct the number of sets of tools to be made at its expense.

The Government reserves the right to reject any source of supply or any bid.

It is estimated that probably only five or six truck makers will be awarded the full amount of assembly contracts to thus avoid the delay and confusion arising from wide distribution of numerous small contracts.

A meeting of the truck assemblers and truck makers who are interested in this business will not be called until after blueprints and specifications have been sent to the parts makers and detailed specifications are completed for the entire truck. Following this it is expected that truck makers and assemblers will be asked to submit bids for final decision within fifteen days after the meeting.

It may be possible that this meeting will be eliminated by sending the makers who display their interest, the necessary information and data and then calling only for a final meeting to submit bids.

HAYNES PRICES HIGHER

Kokomo, Ind., Jan. 18—Factory prices of Haynes models have been increased as follows:

MODEL	NEW PRICE	OLD PRICE
39—4-pass. roadster	$1,825	$1,725
38—5-pass. touring	1,725	1,595
39—7-pass. touring	1,825	1,725
39—Sedan	2,585	2,390
44—7-pass. touring	2,785	2,295

The prices of all touring models will be raised an additional $125 on March 1. Cars leaving the factory before that date will be charged for at the present rate, but after March 1, each touring car shipped, even if ordered in advance, will cost $125 extra.

CAR BODIES BY TRUCK

Lansing, Mich., Jan. 19—One of the first examples of replacing freight cars by trucks for short-haul work is given by the shipment of four truck loads of motor car bodies from Ionia to Lansing. To expedite the deliveries of these bodies the Reo Motor Car Co. sent these four trucks after them. Each of the four trucks carried three bodies. There is also a sleigh in operation on this same work. The trip occupies about 4 hr.

REPUBLIC TRUCKS COST MORE

Alma, Mich., Jan. 18—The Republic Motor Truck Co. has increased the price of its models according to the following schedule, all prices being quoted in single units or in fleets, f. o. b. Alma, Mich.:

	Old Price	New Price
¾ ton	$ 895	$ 995
1 ton	1195	1295
1½ ton	1550	1650
2 tons	1885	1975
3½ tons	2750	2950
5 tons	4250	4500

CHEVROLET RAISES PRICES

New York, Jan. 23—Special telegram—Chevrolet has increased the price of its four-ninety model as follows: Chassis, now $585, will be $625; touring car, now $635, will be $685; roadster, now $625, will be $660. The new prices are effective March 1.

Truck Routes Organized

Master and Manly Makes on Program to Operate Out of Chicago

To Connect New York and Windy City by Motor

CHICAGO, Jan. 23—Motor freight and package transportation over definite routes are the plans of two new services to operate out of Chicago. Definite arrangements have been made by Master Trucks, Inc., Chicago, to inaugurate a regular motor truck commercial freight hauling service between Chicago and New York and Manley kerosene trucks are to be used in short haul shipments to the north and south of Chicago, from Hammond, Ind., to Waukegan, Ill. The pilot truck and others that will make up the fleet are ready for service just as soon as the roads will permit of heavy hauling. A separate organization to be known as the Master Truck Transportation Co., an Illinois corporation with a capital stock of $250,000 has been formed to operate this new service, the prime thought being aid to the hauling facilities of the railroads.

By the time the weather moderates sufficiently for the roads to become passable, the first fleet of twenty-four internal-gear-driven 2-ton Masters will be ready to make its pioneer journey. Some 3½-ton worm-drive Masters probably will be included in the service. All will have special bodies of the stake type with tarpaulin covers, the loading capacities being 12 by 6 by 6 ft. Other minor changes will be made in the motive equipment to blend with the freight-carrying plan.

The route will include Chicago, South Bend, Ind.; Bryan, Ohio; Toledo, Ohio; Cleveland, Ohio; Erie, Pa.; Buffalo, N. Y.; Rochester, N. Y.; Syracuse, N. Y.; Utica, N. Y.; Albany, N. Y.; Poughkeepsie, N. Y., and New York. A speed of 25 to 30 m.p.h. is planned. Special changes in construction to permit of this speed have been made. Pneumatic tires will be used.

The fleet will have with it one truck devoted entirely to the carrying of oil and gasoline for the use of the trucks in the convoy. Another truck has been equipped as a kitchen, for the drivers and mechanics enroute, while a third will carry tents and sleeping equipment.

All the hauling will be done under contracts and there will be no "less than truck load" shipments taken. Furthermore, these full loads must all go to one destination. There will be no intermediate stations for the present, shipments being taken only for Buffalo and New York delivery at first. Contracts also have been signed to insure full loads for the trucks on the return trips.

The trucks will run in convoy formation and 10 or 11 hr. will constitute a day's run. The drivers who start will continue with their trucks throughout the trips. The character of freight to be handled will include anything that can move via a truck of the capacities mentioned.

The rates for hauling will be the same as for express. Present plans do not include way stations for concentrating freight or for unloading for further distribution. The company has had requests from more Chicago and New York manufacturers to make deliveries between these two points than a fleet three times the size of the one contemplated could handle.

Chicago, Jan. 22—To assist the railroads in short haul business and speed up freight deliveries, originating in Chicago and in towns immediately north and south, the Chicago, Waukegan & Hammond Transportation Co. has been incorporated with William O'Connell, former chairman of the Illinois States Public Utilities Commission, as its president. Application has been made to the State Public Utilities Commission for a certificate of convenience and necessity, which probably will be granted this week. As soon as this certificate is used a schedule of rates and times will be issued.

The motor equipment to be used in this motor freight line which is the first to be formed in the middle west and one of the first in the United will be Manly kerosene-burning trucks and tractor trailers, made by the O'Connell-Manly Truck Co., Waukegan, Ill. Investigation has proved that it requires from three to five days for shipments originating in Chicago to reach the terminals of this new transportation line. The company believes it can make deliveries 75 per cent quicker by motor truck, and as tests have proved that the Manly trucks operate on kerosene, the same distance and the same load that they would on the same volume of gasoline, the ton-mile cost will be decreased in the same proportion that kerosene sells under gasoline.

RULING ON TRUCK CARRIERS

Lansing, Mich., Jan. 19—Cassius L. Glasgow, chairman of the railroad commission at Lansing, Mich., states that truck lines advertising transportation from city to city are classed as common carriers and must give bills of lading to shippers, supply reports to railroad commission and be responsible to the shipper. The attorney-general holds this opinion as correct. If the truck companies desire to incorporate or file articles of association they must go through the same process as railroads and the state railroad commission will have control of all concerns carrying on commercial business, is the opinion of these men.

N. A. A. J. ELECTS OFFICERS

New York, Jan. 18—S. F. Beach of the Motor Car Supply Co., Chicago, was elected president of the National Association of Automobile Accessory Jobbers to succeed Charles E. Faeth of Kansas City. Mr. Beach is one of the founders of the organization and has been prominent in its activities since it began. The vice-president is P. H. Lyon, Chancelor & Lyon Co., San Francisco; the chairman of the board of directors is R. R. Englehart of the Siego Co., Davenport, Iowa; the vice-chairman of the board is William Sparks, Sparks-Withington Co., Jackson, Mich.

end of the route that the truck follows.

The positive need for a new type of motor truck road built upon a new engineering and logical basis was the gist of the remarks of George C. Diehl, who is chairman of the good roads committee of the American Automobile Association.

The necessity for and the probable appointment of one centralized Government purchaser of motor trucks in Washington was the high spot of the important address of Christian Girl, director of production, military truck division, Quartermaster Department, U. S. A. Mr. Girl outlined the development of the Government motor truck program and of the necessity of the truck industry selecting a representative in Washington to assist the Government in carrying out this vast undertaking. He favors putting the burden of the production of suitable motor trucks in sufficient quantities to make possible the Government's ambitious program directly upon the motor truck industry. Such a move greatly would simplify matters and will undoubtedly come to pass soon.

MILWAUKEE SHOW SUCCESS

Milwaukee, Wis., Jan. 22—Forty-six Milwaukee motor car dealers, practically all of them distributors in Wisconsin and upper Michigan or lesser territory are showing cars representing seventy-eight makes in this year's show which is Milwaukee's tenth annual, extending from Jan. 16 to 21. The crowds have not been quite up to the mark of former years, but this is hardly to be expected with about 14,000 of the city's masculine population at the front or in war camps. Nor are the extreme weather conditions conducive of large attendance. However, the quality of the crowds this year is far above that of former shows and curiosity seekers are conspicuously absent.

Exhibits are limited to five models per exhibitor, owing to the limited space. This makes a total of 230 cars or chassis displayed in the passenger car section. There are not so many skeleton or cut-away chassis as last year on account of the demoralized condition of traffic resulting from the recent heavy snowstorms. Numerous cars intended for the show are still in transit, even those shipped by express.

This year is by far a better and more interesting exposition than has ever before been presented. In one way the show is larger, for the limitations of the building, which prevent it from being bigger in the general sense of the term, have made it necessary for the M. A. D. to divide the passenger and commercial car sections. Consequently, the first seven days were devoted exclusively to passenger cars, and the last three days to commercial cars.

This year's Milwaukee show appears in a setting representing an Egyptian garden in Nile green and white. Even the gaunt, concrete balconies and galleries are hidden this time, while the row of boxes surrounding the edge of the arena furnishes a splendid seating capacity at a point of particular vantage. Besides the main arena, the two large auxiliary show halls are treated in a uniform decorative scheme, which also is carried out in the rotunda, main lobby and smaller passageways, flanked with accessory exhibits.

Bids for War Trucks

U. S. A. to Be in Market for 5000 Class A Type in February

New Scheme for Placing Contracts Is Outlined

WASHINGTON, Jan. 19—The Quartermaster Corps will be in the market for 5000 class A war trucks early in February and has arranged a new scheme for placing of contracts. Probably between five and seven different companies will be given the assembly jobs.

Under the plan of contract devised, a list of at least four and not more than seven parts makers will be made for each of the following assembles:

Engines	Seat assembly
Axles, front and rear	Wheels
Transmissions and controls	Radiator assembly
Clutches	Springs
Electrical equipment	Gasoline tanks, fenders, hoods and other sheet metal work
Universal joints and propeller shafts	Lamps
Steering gears	Tool equipment
Frames	Carbureter and other accessories
Dash assembly	

Complete sets of drawings and parts lists will be sent to each of these parts makers and each will be provided with a schedule of quantities ranging from 1000 to 3500. The makers will submit bids by mail within ten days after receipt of prints, to Colonel Drake, Quartermaster Corps, Washington, D. C., and all bids are to be f. o. b. the factories. The prices that are to be maximum prices will be submitted by the parts makers to the truck assemblers when quotations are asked of them by the assemblers.

Costs of tools, jigs and fixtures are also to be submitted, and the Government will have the option to purchase any sets of these tools and fixtures at the conclusion of the contract, subject to a suitable depreciation.

The engineering department of the Military Truck Production Section of the Quartermaster Corps will furnish any necessary weights, etc., of parts specified in drawings.

Parts makers are being advised by letter that 5000 A trucks will be ordered for delivery in July, August and September and that these trucks will be purchased by the Government from the truck makers completely assembled and that all parts will be purchased and finished complete by the truck makers.

Van Dyke prints and lists of specifications are mailed with the letters to the parts makers, the Van Dykes being marked "for estimate only." The Quartermaster Corps reserves the right to make inspection of any units furnished in the trucks either at point of manufacture or as a completed unit.

Bids found acceptable from parts makers will if the company is satisfactory as regards financial condition, capacity and organization, be so rated and the company will be placed on an approved list of companies to be submitted to the truck maker to aid him in preparing his total bid for completely assembled trucks. Bidders are informed that the prices submitted to the Government will be maximum in comparison to prices later furnished to truck makers who get assembly contracts. The Government does not guarantee the financial responsibility of any truck maker or truck assembler to whom goods are furnished by parts makers.

Complete sets of tools, jigs and fixtures are to be made up for this work and estimated prices to be submitted in connection with bids on material, and the Government is to have the option of the purchase of these with reasonable depreciation at expiration of contract. The cost of these dies is to be distributed pro rata on an estimated order for 2500 parts. If a parts maker's contract for parts falls short of 2500 the Government will pay for the pro rata difference, while if the order is above 2500 the tool cost will be estimated on the quantity above that number.

Parts makers receiving Van Dykes and letter invitations to bid are requested to wire at once if interested to P. W. Tracy, supervisor of parts plants of the Motor Transport Section, 1421 Eye street, Washington, D. C., stating if bids are to be made.

The truck makers and assemblers are to be notified by letter that contracts for 5000 A trucks will be let shortly and invited to submit bids according to blue prints lists of specifications and bills of materials to be provided by the Government.

Completed trucks or separate units or parts of units are to be subject at all times to inspection and rejection by the inspection division of the Motor Transport Section.

Minimum Allotments

A minimum of 750 trucks and a maximum of 2000 trucks will be made to any one maker. The truck makers are to purchase all units and deliver the same completely assembled to be accepted after final inspection by the Quartermaster Corps. The lists of approved parts makers will be given all assemblers by the Government, but no guarantee of responsibility of these makers is made, some being subject entirely to the supervision and inspection of the truck assembler.

In cases where the truck maker is also the maker of certain units upon application survey of his plant will be made and if found satisfactory he will be placed upon the list of parts makers for those units he is best suited to make.

The cost of the dies is to be distributed pro rata on an estimated order for 2000 trucks and if the order falls short of this figure the Government will pay for the pro rata difference.

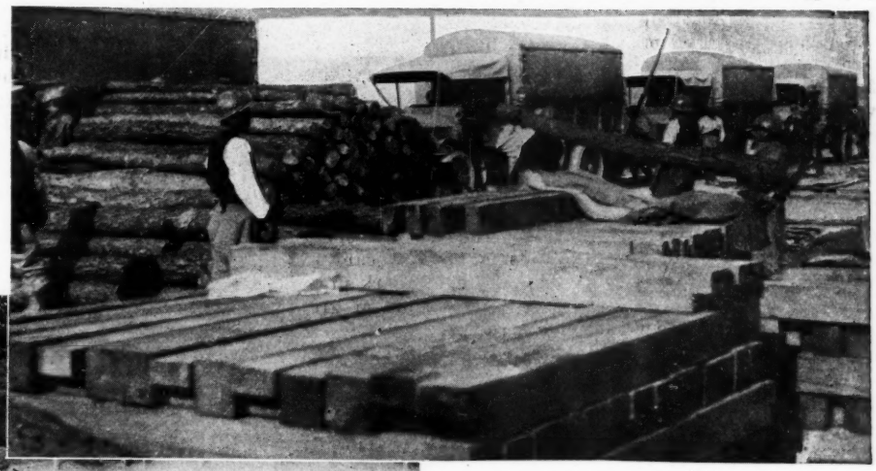
A list of units and selected parts makers is sent each assembler and it is expected that parts not mentioned in the list are to be obtained by the truck assembler without suggestions from the Government as to sources of supply.

Truck makers and truck assemblers are requested to telegraph acceptance of invitation immediately to Christian Girl, chairman of the Motor Transport Section, 1421 I street, Washington, D. C.

All bids are to be open and not sealed, to get a selective service of trucks much like the selective service of men for the army.

In German South Africa the British put motor trucks on flanged wheels and ran them on the railroad tracks in the campaign that captured Germany's colony there

This truck carries building material for temporary houses



The truck in war service may carry anything, from troops to timbers

A truck may transport troops up to the firing line, above, or it may be back of the danger zone serving some peaceful purpose as that of the traveling bazaar, left, of little necessities permitted by general headquarters to frustrate high prices usually asked by natives at the front. In all cases, facilities for repairs must exist and be ready for action always

Keeping Army Motors Healthy by Repair Efficiency

By W. F. Bradley
Motor Age Special Correspondent with the Armies in France

IN deciding on spare parts and tools for trucks, American manufacturers and authorities appear to have been influenced too much by touring car practices and to have assumed, consciously or unconsciously, that their vehicles would operate singly. Thus some American trucks are sent into France with spare valves and springs, fan belt, magneto parts, rubber hose, gaskets, spare main bearings, bolts, nuts and washers, etc.; some of the specifications which have appeared in print provide for an even more elaborate stock of spares.

Early Luxury of Repairs

Prior to 1914 there was a somewhat similar luxury of spares in the French army. Since then the motor service has learned much, and one of the first actions is to strip American trucks of all the spares supplied by the factory and to order trucks from their own factories without any accessories. The unit in the field is not a single truck but a section comprising fifteen to twenty vehicles, according to their individual capacity. An army-trained motor vehicle driver is not given credit for any real mechanical knowledge and is assumed to be incapable of making use of spares even when they are necessary. In the majority of cases this assumption is correct; the exceptions are beneficial to the service, but they are so rare that they need not be taken into consideration. Compared with the early days of the war motor organization in France is so highly developed that it would be as absurd to give a big stock of spares to individual drivers as to place them in the hands of men at the wheel of Fifth avenue buses.

One of the best American trucks, and one with the best supply of spares and tools, was noticed on the French front with reserve valves and springs carefully packed in a special spare parts box. For some reason or other these valves had been allowed to remain in the possession of the driver, but the officer in charge stated that this particular truck never burned out a valve, and the spares were absolutely useless. Another American truck with poorly designed waterjackets had a rather high consumption of valves, while cracked jackets were not unknown. Yet this maker did not consider a pair of valves a necessary part of his truck equipment.

The individual French army truck carries a kit of tools comprising wrenches to fit every nut, hammer, files, grease gun, oil can, jack, a few bolts and nuts, two spark plugs and, of course, a reserve supply of grease and oil. The tools are uniform for each make or type and to facilitate control are carried on a special tool rack, or board, so that the officer can tell at a glance if any article is missing.

Each section of fifteen to twenty trucks has a breakdown tool kit in charge of two mechanics, who usually are not called upon to drive. In some cases the mechanics have at their disposal a two-wheel canvas-covered trailer, which serves as a storehouse but can be used to a limited extent as a workshop. The trailer idea is excellent, for even in a war of movements every section must have some base from which it operates, and the mileage of the trailer is only a fraction of that of the trucks.

Only hand tools are given out to the mechanics responsible for the maintenance of a section. These comprise a vise, bench drill and breast drills, taps and dies, brazing lamp and, of course, wrenches, hammers, files, punches, etc. In the French army spare parts are divided into two categories: special and general. The former covers parts which are special to any one make, connecting rods, for instance. General spares are bolts, nuts, washers, fan belts, spark plugs, gaskets, etc. The section mechanics have a pretty complete stock of general spares but very few specials. Section mechanics are expected to do all running repairs but not to undertake anything of a really elaborate nature; they do not have to take down engines but will decarbonize cylinders and change connecting rod bearings. It is because the extent of their work is limited that they are not allowed to keep more than a limited selection of spares; they are, however, in a position to obtain parts required at very short notice.

Traveling Workshops

The next stage in the line of repairs is a traveling workshop attached to each group of three sections, or forty-five to sixty trucks. While the section may have nothing more than a good kit of tools carried on one of the trucks, the group repair shop always is mounted on a trailer; frequently there are two trailers, one carrying bench and tools and the other being fitted up with general spares. No power-driven tools are available, but a fairly extensive range of repair work can be undertaken without, however, attempting anything like a general overhaul. Section mechanics are interested in keeping trucks on the road; group mechanics take individual trucks at intervals of six weeks or two months, according to circumstances, examine them carefully and carry out repairs and minor replacements.

Back of the group is the groupment repair department. This is the last and most important mobile repair outfit in the field. It has to care for four groups of three sections each, being a total of 180 to 240 trucks, together with all the officers' cars and motorcycles attached to the sections and groups, and its own service trucks and officers' cars, making a total not far short of 300 vehicles.

A groupment repair department is one of the most interesting features of the motor service at the front. The plant comprises a twin-cylinder gasoline engine and dynamo furnishing current for driving a lathe, a milling machine, a drill press and an emery wheel. The powerplant and the emery wheel are on a two-wheel truck trailer, solidified by props at the four corners, and the lathe, milling machine and drill press are on a similar trailer by the side of the first. There also is a hydraulic tire press on a strong four-wheel trailer capable of handling the band tires used by all the trucks in service with this groupment. To secure a solid foundation pits are dug to receive each of the four wheels and heavy blocks of wood are placed under the frame of the trailer.

A repair camp of this nature usually is pitched within a slight clearing near the edge of the wood to give the men the advantage of shade in summer and to hide

This is a complete workshop attached to a British transport convoy

Repair efficiency keeps trucks in army road service

them as far as possible from the observation of enemy airplanes. The two trailers with power and tools occupy a central position in the clearing, with a series of twenty or more trailers, each one fitted up to carry stores or in some cases used as an office around them. The groupment repairshop is the first important unit in the field to carry a large stock of spares; it uses them for the vehicles brought to it for overhauling and also distributes them, on order, to the groups and sections to which it is attached.

It is necessary to point out that the remarkably efficient method of dealing with spares or general stores has been evolved under full war conditions. In 1914 motor cars never had been used for war purposes in sufficient numbers for such an organization as this. The system which keeps all spares out of the hands of individual drivers, reduces the parts handled by section chiefs and heads of groups to a minimum and maintains a very complete supply with the groupment, ready to be handed out on immediate requisition, has been found to be the most practical and the most economical.

Efficiency in Upkeep

Under all the excitement and unforeseen contingencies of war, there are plenty of opportunities for waste and extravagance if a sound system is not established; at the same time a too rigid system would cripple the usefulness of the transport service by keeping off vehicles unnecessarily from the road. The groupment repairshop receives its supplies from a central store in the interior of France. As an example of how this was done, I was shown a parts catalog of Pierce-Arrow trucks, as this was the make handled by the groupment visited. Every single item which goes to the make-up of a Pierce truck figured in that catalog under its French designation and with its factory catalog number. Opposite the part were parallel columns showing the number of such parts which should be maintained: (1) in the hands of the individual driver, (2) of the section mechanic, (3) of the group mechanics, (4) in the groupment stores. Columns one and two frequently showed a blank; column three often was filled and column four always carried some number.

From this book the officer in charge of the groupment led me to card files carried on one of the trailers. Here, in uniform size boxes, was found a set of multi-colored cards, one color being for engine parts another for transmission, another for final drive, another for engine accessories, such as ignition and carbureter, etc., and every part composing the truck having its own part. At the head of the card was the name and number of the part and the maximum and minimum number of such parts to be kept in the groupment stocks. Below, in two parallel columns, were the numbers of parts received and given out, together with the dates and the number of the order. At intervals of three days the storekeeper balanced the cards, and if the stock had fallen below the minimum indicated at the head of the card made out a requisition for more of such parts to be sent up from the central supply department in the rear. Briefly, the system is that adopted by all American banks for clients' passbooks, and recognized as giving the most accurate control with the least amount of labor.

Under such a system as this the value of dividing all spares into special and general is seen. General spares, such as bolts, nuts, washers, split pins, etc., are given out by the kilo and do not need as close a supervision as magnetos and carbureters which incidentally are always attractive to certain classes of mechanics and have a habit of disappearing if track is not kept of them.

The method of carrying spares is of course quite different from that adopted in any civilian organization, for in this latter the question of mobility does not have to be considered. The central supply department is responsible for the packing of the parts in special boxes which will occupy the minimum of space, give the greatest accessibility and prevent all breakage no matter how roughly the boxes may be handled. This in itself has called for a considerable amount of study and frequent modifications to get the best results. One make of truck "chews up" timing gears at regular intervals; on another make such gears never need touching except in the case of a road accident or damage by shell fire. These conditions have been learned under war experience and provided for accordingly.

Spares of the bolt and nut, washer, split pin and rivet variety are carried in series of drawers mounted immediately over the axle of the two-wheel trailer. There are two sets of such drawers, back to back, and thus accessible from each end of the trailer. These drawers are fastened permanently on the trailer and each is provided with a lock. On receiving an order to move, the drawers are locked, some of the lighter and more bulky spare parts boxes placed on the two ends of the trailer, the canvas and screens let down and fastened and the trailer hitched up behind its truck.

The groupment repairshop is qualified to undertake the entire overhauling of individual trucks and touring cars. A section or group mechanic, for instance, is not expected to lift an engine right out of the frame, reline the bearings, change rings and wrist pins, etc., but a groupment repairshop must do all this, the trucks being sent in for such overhauling at regular intervals—compatible with military activities. In one of the groupments visited American trucks were found stripped to the bare frame members and steering gear. By tripod and block and tackle a 5-ton Pierce-Arrow engine, one of the largest powerplants handled at the front, was lifted out of the frame and placed on a stand for complete dismounting; the gearbox and rear axle had been treated in the same way. Although the power-driven machinery is under permanent cover, much of the repair work has to be done in the open air, or with no more protection than a tarpaulin stretched by ropes from convenient trees.

Overhauls Trucks and Cars

The officer in charge of a groupment repairshop possesses a mechanical control over the whole of the 200 or 300 trucks and touring cars for which he carries out repairs. He knows, for instance, if the drivers of one section are more destructive or show a greater number of accidents than those of another. He can compare the work of the section and group mechanics; he knows the tire mileage for each section and group, and he knows the proportion of defective tires supplied by respective makers. According to the officers in command, tire mileage in the war zone does not average more than 6,000 miles on driving wheels. These figures were given for Pierce-Arrow 5-ton trucks. Every tire manufacturer gives a guarantee of minimum mileage, and if this mileage is not attained the tires are returned to the rear for expert examination and report, and ultimately a claim on the manufacturer. Judging from observation, the quality of tires furnished at the present time is inferior to that of earlier days of the war. Quite an important proportion of the tires developed defects before the treads showed appreciable wear.

The mobility of the three repair departments described is variable: the section repair outfit can change its base at a moment's notice; a group repair outfit can get under way in an hour; a groupment being a big establishment, with seven to twelve service trucks, about twenty trailers with tools, spares, documents, etc., is obviously not intended to strike camp at very frequent intervals. After one of the recent advances of the French army, however, the groupment workshops were all packed up and on the road in exactly 6 hr. after the order had been given. Considering the section as having its headquarters 5 miles behind the front line positions, the group headquarters would be 8 miles in the rear and the groupment from 10 to 12 miles behind the lines. These distances, however, are decidedly variable.

These motor organizations in the field undoubtedly are handled skilfully by men who are determined to get the maximum efficiency at the lowest possible cost. In an organization so complex that possibilities of wastage are inevitable, it is only justice to set on record that the French officers seek efficiency and economy just as keenly as any civilian haulage contractor who is out for profits and profits only. Trifles often indicate the general tendency. Thus on every touring car there is a notice on the screen in front of the driver stating that national interests demand fuel economy, and that it is up to him to avoid waste when filling, and to avoid running the engine when the car is at a standstill. Truck drivers are impressed by an appeal which can be translated roughly as follows:

"This truck is worth $3,000; the nation shows its confidence in you by entrusting you with such a valuable piece of machinery. Naturally, as a French soldier you will not abuse that confidence."

Control Very Effective

While appealing to the best instincts of the men, the authorities are not satisfied with a mere appeal but exercise a control hardly less effective than that of a metropolitan motor bus company. Guess work, approximation, accident are reduced to a minimum in the truck services at the front. It is known how much gasoline and oil a truck should consume, how long its tires should last, how often it should visit the repair shop. How this control is exercised is matter for another story.

Although the groupment repair shop is the last and most important organization in the field, there is still another in the war zone, from 30 to 40 miles back of the lines. This is the general revision repair park established to handle complete sections of trucks. One such park employs 600 men, of whom 360 will be professional and skilled mechanics, and the remainder soldiers of no particular ability. A park with this staff will turn out 200 trucks a month, of which 150 will have been overhauled completely. Except in cases of road accident, damage by shell fire beyond the ability of the groupment repair shops, the officers' cars needing important body repairs, the revision park only takes in complete sections or groups of fifteen to fifty trucks, all of one make or model. When trucks are sent back to the revision park they are lost permanently to the section with which they have served previously, for they are out of commission for several weeks and in the interval have been replaced by other vehicles. They go forth after revision to whatever section that may need them at that particular time. When individual trucks are brought in, usually by reason of accident or careless handling when far away from their own base, the drivers are retained until the repair work is done. Usually these men are given more than a normal share of fatigue duty, merely as a salutary measure against visits to these parks. When complete sections are sent in, the trucks usually are put on the train and are unloaded right in the grounds; they are not accompanied by their drivers.

To keep working on a satisfactory and economical basis, it was considered necessary to always have 600 trucks in hand. These would be comprised of various makes, but an attempt was being made to limit each park, as far as possible, to two important makes and to group six or seven small and little known makes in one park specially equipped for dealing with them. While obtaining spare parts is not really a difficult problem, motor car factory organizations all have changed to such an extent that there is inevitably a certain amount of delay in obtaining parts required.

The great majority of trucks brought into the revision park being intended for a complete overhauling, engines first are stripped of their magneto and carbureter, and then the entire chassis dissembled into its individual components, the engine, gearbox, steering gear and rear axle going to their respective departments. Frames are examined with a view to replacing any loose rivets or repairing, if any fracture has developed, and then are placed on specially designed adjustable trestles, which will carry six frames superimposed.

It has been found a wise precaution to remove the carbureters and magnetos as soon as convoys are received at the revision park, otherwise these accessories are apt to disappear. Every magneto is examined by an expert, repaired if necessary, is tested by being run at speed and then sent to the stores. Carbureters are treated in the same way.

Application is made for a magneto and carbureter when the engine reaches the assembly shop and is ready to go through to the test bench; the engine goes into the chassis with the magneto and carbureter used on the brake tests. In all the fitting shops men work in teams of nine under a chief mechanic; laborers are not attached permanently to any one group, but are moved about from group to group at the discretion of the chief of the section. In each of the various sections graphs are prepared every five days showing the output not only of the entire section but of the individual teams working in that section. Thus the respective values of the terms is ascertained, and at the same time the general management is aware immediately if there is a falling off in the output of any one section in relation to the whole. Completely assembled, the trucks pass through to the test department, where they are tested on the road; after this they go to the paint shop, then to a park to await their turn for delivery. As only complete sections are received from the front, so only complete sections are delivered to the armies.

Body Work Handled

A revision park has to handle a rather important quantity of high-class bodywork for which the groupment and sectional repairshops in the field are unfitted. Although generally satisfied with a dull gray finish, staff officers demand really comfortable closed cars with first class upholstery. Usually these cars have been produced in the first place by the leading European body makers, and to maintain them in condition calls for the services of an important number of really skilled body hands. Truck body repairs, on the other hand, are very simple.

There is a picturesque combination of modern efficiency and makeshift about a revision park. To turn out the quantity of vehicles required in the limit of time considered necessary, it is essential to adopt modern factory methods; yet war conditions require that the staff shall get along with all kinds of expedients.

Garage for French transport reserves from a newly taken German position

Factory Reproduction Ideas Given

Motion Pictures of Caterpillar Tests Accompany Paper on Efficiency

CHICAGO, Jan. 19—The fundamental principles underlying factory reproduction, and motion pictures illustrating the rigorous tests to which the Holt caterpillar tractor was subjected to by the various departments of the Army, constituted last night's program of the Mid-West section of the Society of Automotive Engineers.

F. A. Carlisle in his paper on "Efficiency in Factory Reproduction" contrasted the present day methods and workmen with those of former years in regard to accuracy, speed, etc., concluding that the present day workman was made more efficient than the old craftsman by reduction of waste motion, proper tools, less fatigue and in some instances even his social well being was considered, all of which tend to promote speed and accuracy in production. In closing the necessity of the planning department to facilitate production in the correct amount and at the correct time was discussed.

Pictures of Holt

The tractor pictures were of the tests of the Holt machine, before they were approved by the Army, and the Ninth Field Artillery, which was the first motorized battery in the world, also was shown in field maneuvers.

F. A. Carlisle's paper in brief is as follows:

It is frequently stated that man cannot improve upon nature and that possibly stands true for the purposes toward which nature is working, but in the commercial world we can no longer take time to hunt through the forests for peculiarly shaped growths for our ox-bows, canes or briar pipes.

Time has become too valuable and our interdependence not only as to individuals but as nations has become so essential that it has become necessary to standardize, if we are to expect to live or even exist on our present plane.

Within the memory of many of us stupendous changes in the industrial world have taken place and whether we have welcomed it or not, we have been forced to go forward with the current of events. While we sentimentally sigh for the good old times, we do not contemplate going back to the old time basis of commercial and industrial life if we could.

This has been heralded as an age of invention and mechanical awakening, and while this is not to be minimized, to my mind the development of efficiency in factory reproduction is more responsible for our present state of advancement than all the inventions considered together. Nay, more than that, this insistent demand for standardized production has been responsible for a very large proportion of these very inventions.

Probably the manufacture of typewriting machines was when the modern movement gathered its present impetus, though previous to that time the demand was making itself felt among many of the growing manufacturing interests. However this may be, the phenomenal growth of automobile manufacturing more than any other industry has brought the movement to its present zenith.

The old journeyman craftsman with his prodigious pride in his own personal skill and ability is rapidly becoming extinct, and in his place has come the speediest with skill limited to but one or a few operations, and greatly increased earning power both for himself and his employer.

To be truly effective efficiency must go to the sources of production. Hence as never before specifications are receiving the closest scrutiny of experts. When your automobile manufacturer decides to bring forth a new creation his engineers must consider what it will mean to the factory, and the location of every hole and piece of material must be weighed as affecting repairs, replacements and improvements on machines previously produced.

Next the equipment of the factory in machines and personnel, and even physical location, must be carefully considered, or it may be found that when manufacturing has commenced that prohibitive investments in special machinery and factory layout will be encountered. The question of special machinery, practically worthless for any other than its intended use, is very serious, and in view of the rapidity with which obsolescence, brought about by improved methods, retires machinery costing many thousands of dollars, essentially as good as new, is not by any means an insignificant problem.

To these problems the engineer must also assume the role of the prophet and attempt to forecast the future so far as he may, to a certain possible development which may revolutionize present conditions. Not the least of these problems is the supplying of raw materials with the world in its present chaotic condition. An important consideration always, it is tenfold more difficult today in view of embargoes and governmental requirements which develop with startling frequency.

The careful tests, both chemical and physical, which must continually be made to insure uniform quality of product are today employing a constantly increasing force of experts. For not only must every part that enters a modern machine be along the lines of the building of the "Wonderful One-Horse Shay" of poetical renown, but also a deviation from standard may completely upset the progress of fabrication in the well ordered production of a modern factory. The duplication of parts by dies, jigs and special machines has developed the use of gauges and templates to a fine art, and the variation of .001 in. has become a matter of more serious import than the blacksmith's "hair" (popularly supposed to be ⅛ in.) of a decade ago. It is not unusual to find in these days the boys but yesterday from the farm armed with a micrometer, calipers, debating in terms of a thousandth of an inch. While to the layman this may seem an inconsequential thing yet the initiated realize how much of the economy to the comfort of the ultimate consumer hangs by so slender a thread.

It is told that one of the crushing disasters on the Russian front of a year ago was caused by their inability to use, at a critical moment, shells which had, through error or tampering with gauges, been finished to one thousandth over size. The famous loss of the horseshoe nail, as recited in our more youthful days, may be characterized as "coarse stuff" as compared with modern necessities. Efficiency in factory reproduction is by no means confined to the simple ability to make thousands of duplicate parts within very close limits as to size and quality.

The value of timeliness is of equal importance, so much so, that to produce a thousand automobiles a day and find that the supply of a single certain small bolt had failed would be a supreme disaster. Factory reproduction depends absolutely for its success upon the ability to have an adequate supply of the right things at the right time, and the financial success of the institution is largely influenced by having as small an amount of capital tied up in supplies as manufacturing conditions warrant.

Between this Scylla and Charybdis has stepped the modern production manager who simulates the tight rope walker with 100 per cent production efficiency at one end of his balancing rod and minimum capital investment at the other.

To the uninitiated the planning or production department of a modern factory may appear as a philanthropic effort on the part of the management to supply an endless amount of red tape, the manipulation of which furnishes pastime for a number of able bodied men who might be better employed in making automobiles or other useful products.

The planning department which does the best work has the most time on its hands. We blithely risk our health to the trained physician who feels our pulse and looks at our tongue and follow his advice if the medicine he prescribed tastes good, and we think to take it. The efficient planning department is feeling not one but often thousands of the throbbing pulses of factory reproduction and the error of a single beat rouses him to instant action.

It is from this conning tower of the modern factory that go the impulses properly graduated, that produces each day its quota of finished products from the assembly of the thousand parts, some made within the plant itself and some which have come from the ends of the earth, that is to minister to the necessity and the comfort of the present-day individual. The progress and quantity of every part in process of manufacture and the certainty of its appearance in the department in which it is needed not a day too soon and by all means not a day too late is of supreme importance. This is made possible by an elaborate system of planning boards which are constantly being studied and adjusted from the never-ending stream of progress, reports passing to this department from all departments of the factory.

This paper would be decidedly incomplete if no consideration were given to the human element entering into factory reproduction. A very small part of the sum total of human education is gained in our schools of all grades excellent though they may be. The greatest single educational institution of America is our factories, and enormous sums are expended annually directly or indirectly for this purpose alone. Passing ever the schools for apprentices and other employes maintained by our larger corporations, the workings of which are more or less a matter of common knowledge, let us take our stand by the worker at the machine or bench.

He must be first trained to accuracy and to assist in this he is not only provided with proper tools but the effects of proper lighting, fatigue and even his social well being have in many instances been take into consideration. It is difficult for a man to attain proficiency who is handicapped by any removable obstacle. Accuracy is of much more importance than mere amount of production, and to this end he must be made to understand its importance and to keep it always before his mind's eye. Not only may inaccuracy make his own time a total loss to the management but also the material involved and the labor done upon it by others, to say nothing of the disastrous effects it may have on the general production.

Following accuracy, speed is a highly important feature directly related to the ever-present specter of overhead expense to the factory and earnings to the worker. Waste motion is a fruitful source of loss to all concerned, and time and motion study men have been brought into existence to assist him in determining the most efficient method of performance. Expansive machines, efficient in themselves, but half solve the problem of reproduction if the worker has not been taught to develop them to their maximum capacity.

Many other features entering into greater detail of this most interesting and essential present-day movement will suggest themselves to us as we of necessity must take cognizance of these things which touch us so vitally. Every class of business has its own peculiar problems, but underlying all are certain fundamental principles which we must recognize if we are to go forward. Efficient mechanical reproduction is a growing and prime essential.

WHAT THIEVES DID TO 1917

Los Angeles, Cal., Jan. 18—The twelve months of 1917 constituted a million-dollar year for motor car thieves in this city. The statement is made by Kirk Morgan, alias David Beatty, a confessed thief now under arrest, that this is the "city of easiest pickings" for thieves in the country. He claims it is possible to steal any car parked in the downtown district. Blame for this condition is placed by Morgan on the carelessness of the car owners. He cites the fact he stole eight cars of the same make successively discarding each when it became too road soiled to please his fastidious taste. The daring of the thieves was illustrated a few nights ago when they attached a tow line to a valuable car standing under an electric street lamp as several bystanders looked on, took it to another part of the city and stripped from it every removable part. The owner had left his car locked and presumed it was safe.

The Los Angeles thief goes well prepared to his job as evidenced by an incident reported to the police Christmas night. Two men were seen to stop a car alongside another at a curb. They ex-

amined this car hastily and discovered a locking device on the front wheel. Without delay they removed the entire wheel from the axle, replaced it with another and drove the car away. The person who observed the occurrence said it was all done so quickly he did not realize the men were stealing the car until after they were gone with it.

The average number of cars stolen here daily is a little less than five. From Jan. 1 to Nov. 30, 1917, the cars stolen numbered 1434. Of these 946 were recovered. It is estimated thieves have profited to the extent of about $225,000 from their car thefts during the year and about $20,000 from accessories taken.

TOUR TO PENETRATE MEXICO

Kansas City, Mo., Jan. 11—The King of Trails will be the route of an official tour under the auspices of the association and government of Mexico this spring between San Antonio, Tex., and Mexico City. Texas has welcomed the King of Trails into the state, and this highway is now marked throughout the state, except for a short space near Galveston. Feb. 6 and 7 the convention of the Texas Good Roads Association will be held at Taylor, Tex. Several other organizations will hold meetings at the same time; and the plans for the organization of an associated motor car club of the state will be brought to fruition at this time. The state meeting of the King of Trails will be held at San Antonio Feb. 9.

The tour to Mexico City is the climax of plans made for several months, the Texans having been in conference during this period with the secretary of state of Mexico, who has spent the winter at Austin. This official has been specifically acting as the representative of President Carranza in planning the tour of next month and in promoting the details of the continuation of the King of Trails to Mexico City.

President Carranza will send his fiscal agent to Taylor to meet the road boosters and the King of Trails committeemen and to travel with them over the route.

Annual Motor Report Shows Growth

1396 Trucks and 420 Cars Purchased by Government in Fiscal Year

WASHINGTON, Jan. 18—The annual report of the Quartermaster-General of the Army just submitted to the Secretary of War contains an interesting chapter about motor transport. It sets forth in considerable detail that during the fiscal year 1917 a large part of the motor transport activities of the army was confined to the southern department.

During the period when the punitive expedition was operating in Mexico, the expedition was supplied almost entirely by motor trucks. In addition to the troops in Mexico those troops stationed along the Mexican border were supplied by motor trucks whenever the distances were so great as to render animal transport difficult or wherever the roads were satisfactory or at all suitable for truck transportation. This experience rendered it possible for the War Department to pursue its investigations in the matter of motor transport under conditions unusually favorable for the development of a type of motor truck suitable for the military service.

Thirteen different types of trucks made by eight manufacturers were sent into Mexico and along the border at the time of the operation of the punitive expedition.

When the punitive expedition was withdrawn from Mexico a large number of truck companies employed in that section became surplus. These had been run constantly for a period of a year or more, undergoing only such repairs as it was practicable to afford at short intervals while they were laid up.

Shops established at El Paso and San Antonio for maintaining these trucks have been actively operated in the rebuilding of a large number of trucks, and as truck companies have been rebuilt they have been distributed to various camps and cantonments occupied by troops of the National Army. Their utilization at cantonments has greatly decreased the cost of construction and upon completion of construction they have become available for utilization by the troops stationed at these points.

Exhaustive tests of trucks, tractors and trailers have been made in the Big Bend district from Marfa, Tex., to points on the Mexican border, varying in distance from 86 to 129 miles over mountainous country, where poor roads, steep grades and long stretches of sand form a combination to demonstrate whether motor transport would meet the Government requirements. Tests were made under the following conditions:

Trucks were leased to the Quartermaster Corps at a nominal rental for a period of time necessary to operate over a distance of 2000 miles.

The Quartermaster Corps furnished the necessary chauffeur and services for the operation of the truck, and provided oil, gasoline and other materials.

Trucks were maintained by the Quartermaster Corps, except that broken parts were replaced and changes in construction made at the expense of the manufacturer. The truck was delivered to the Quartermaster Corps at the point designated by the officer conducting the test, and returned to the manufacturer at the point where the test was concluded.

The report shows that during the fiscal year ended June 30, 1917, the following motor transportation was purchased, except in the Philippine Islands: 1,396 motor trucks, $3,701,958; 420 motor cars, $416,343; 645 motorcycles, $192,168.

Motor transportation in use June 30, 1917, except in the Philippine Islands, amounted to: 2965 motor trucks, $8,223,719; 58 motor tank trucks, $196,100; 12 motor machine shop trucks, $41,603; 6 motor wrecking trucks, $25,438: 437 motor cars, $454,632; 670 motorcycles, $190,801.

Banquet of S. A. E. in New York, which was attended by more than 1100 members and guests

The Automotive Industry as Seen from Two Viewpoints

By Governor Charles S. Whitman of New York

ALL of our wealth, our ingenuity, our enterprise, our labor and inventive skill, as well as our man-power, must be and is devoted to the service of our country. And, perhaps, there is no other one manufacturing industry that may contribute more to the winning of the war than the one here represented.

The present world-wide conflict has demonstrated the tremendous importance of this new method of transportation and the great service to the country rendered by those who are supplying for the use of our armies this absolutely indispensable means of locomotion.

The motor so far has played a role in the struggle such as even the most enthusiastic military man never dreamed of before. It is true, as has been said, that "this war will be remembered as a war of trenches and of motors."

When we realize how great is the contribution of those whose labor and capital, whose time and energy and enterprise devoted to this industry, to the cause of National Preparedness and National Defense, in the great field of aviation as well as in that of transportation on land, we are justified in saying that those here at work are engaged in patriotic service.

By Charles W. Stiger

President Motor and Accessory Manufacturers' Association

NEVER in its fourteen years' history has the Motor & Accessory Manufacturers' Association meant so much to the manufacturers who constitute its ever increasing membership, to the industry as a whole and to our Government as during the past year.

With the declaration of war and President Wilson's remarkable appeal for the overthrow of German militarism that the world might be made safe for democracy, there was opened up new fields of endeavor—greater and more important than any one ever dreamed.

With the same initiative, energy and never-die spirit that has stamped the motor car industry as the most spectacular in the industrial history of this country, manufacturers of motors, parts and accessories saw their opportunity to assist the Government in the winning of the war and almost over night readjusted their organizations, with the result that today wherever motor cars, parts and accessories are made, there you will find the making of munitions and other war materials.

Probably no aggregation of men are taking a more important part in the winning of the war than those who constitute the membership of the Motor & Accessory Manufacturers' Association. Others, of course, are just as patriotic and are doing their full share to assist the Government in the conduct of the war, but because of the nature of their business, the makers of motors, parts and accessories were among the first to be called upon to turn out parts for army trucks, Liberty airplanes, submarine chasers and all sorts of Government materials.

Members of the Motor & Accessory Manufacturers' Association will make quantity production possible for all Government war materials just as they have for the building of motor cars. Motor trucks, airplanes, munitions, submarine anchors and other war commodities could never be turned out in the enormous quantities—required by our Government if it were not for the unusually well equipped plants of the members of this association.

In these times of stress and depression, the men who are called upon to direct the affairs of such organizations as the Motor & Accessory Manufacturers' Association work under an unusual strain and I take this opportunity to appeal not only to members of the M. & A. M. A. but to all manufacturers of motors, parts and accessories for suggestion and aid in every way possible to meet the emergencies of the occasion. I congratulate the manufacturers of motor cars, parts and accessories upon their patriotism, willingness and ability to do those things which our country at this critical time needs and only have to ask you to look around to see those motor car men who have made every sacrifice to go to Washington and "do their bit"—which is no small amount, I assure you—in the good work which is being accomplished in Washington by the civilian organizations.

I appeal to all organizations affiliated with the motor car industry at this time through your daily contact with those who are interested in the industry to urge upon them a continuation of the good will and co-operation in this important work, and their aid in impressing it upon all that America is involved in the greatest war the world has ever known and that the winning of which will mean every man rising above personal consideration and being prepared to forego all selfish interests, suffer all inconveniences and sacrifices necessary to maintain the manhood of this nation at the front—whose sacrifices for nation and democracy are of such magnitude that our greatest efforts and sacrifices pale into utter insignificance in comparison.

These are times when every American is back of his Government with all his soul and might, or is its enemy. Let us thank God that there are but few of the latter in our midst and let us all realize the necessity for putting our shoulder to the wheel and helping our Government to find and put such of these in safekeeping, in order that sedition and pernicious ideas may be stamped out for all time.

NEW FUEL PROCESS

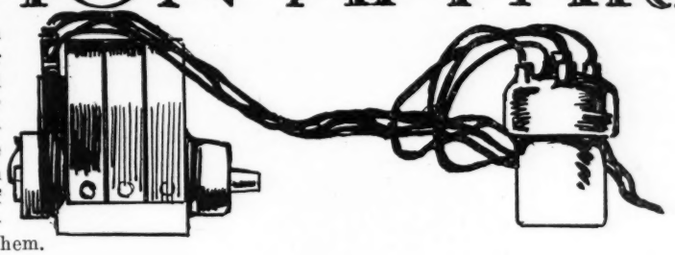
New York, Jan. 21—A new process, which, it is stated, will triple the quantity of gasoline obtainable from crude oil, is said to have been perfected by Dr. A. H. Ramage, who is a member of the American Electro-Chemical Society. It is stated that a company has been formed in Detroit to manufacture and market gasoline produced under this new process and that Christian Girl, head of the Standard Parts Co., Cleveland, is interested in the company, which also includes A. H. Goss, a Detroit capitalist, E. W. Farr, a Cleveland capitalist, S. A. Fletcher, an Indianapolis banker, H. B. Smith, a Bay City, Mich., banker, F. C. Finkenstaedt, Bay City, formerly head of the National Cycle Co., H. E. Earhart, head of the White Star Oil Co., Detroit, and A. E. Leopold, a Chicago capitalist, in the make-up of its official personal.

It is stated the Ramage process differs from the Burton process and does not employ the cracking principle. Instead the oil is claimed to be chemically charged as it passes through the stills with the result that the yield of gasoline is tripled. It is said that the owners of the process have offered it to the government for use for the duration of the war without cost.

BOSCH LOSES $100,000 SUIT

New York, Jan. 21—The Bosch Magneto Co. has been directed to pay Samuel W. Rushmore, inventor of the Rushmore starter, $100,000 for breach of contract in that the Bosch company failed to use the name "Rushmore" in its advertisements of Rushmore starters. According to the contract, the Bosch company was to describe the starter sold as the "Rushmore" starter or the "Bosch-Rushmore" starter or "System Rushmore," failure to do so involving a penalty of $100,000. Judge Hand has decided that the Bosch company broke its contract and ordered it to pay the $100,000. Bosch will appeal.

IGNITION APPARATUS



DEVELOPMENT in ignition systems during the past year has been directed mostly toward meeting the needs of the tractor on the one hand and war requirements of aviation engines on the other. However, there has been some advancement in the detail of car ignition, a combination magneto and generator being among them.

Magneto Ignition

Bosch

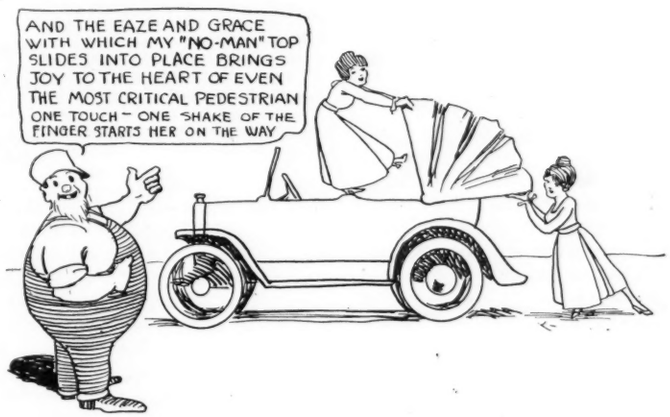
The Bosch magneto is unchanged in its design and construction for this season. About a year ago the company concentrated upon the production of its more popular types of ignition apparatus and selected for the purpose not more than a half dozen of the best known and most efficient of them. Bosch magnetos are made for engines of any number of cylinders, and in addition there are instruments and fittings to replace battery systems on many of the popular makes of cars.

Three magnetos are offered this season, the models NU, DU and ZR. The former is for four-cylinder engines of under 30 hp., with a special model for installation on the Ford. The other models are for larger engines, but fundamentally all instruments are the same. The NU differs from the others in the matter of current distribution, employing a double slip-ring which acts as a current collector and distributer.

The most popular instrument for airplane and other work is the ZR model, which is used on four- and six-cylinder motor car engines and marine engines. The type ZR Ed. 16 magnetos usually are employed as sole ignition on an engine or, in some cases, in connection with a battery system operating on a separate set of spark plugs. This type without alteration also is employed to provide battery and magneto ignition on one set of plugs, this being accomplished by the Bosch vibrating duplex ignition system.

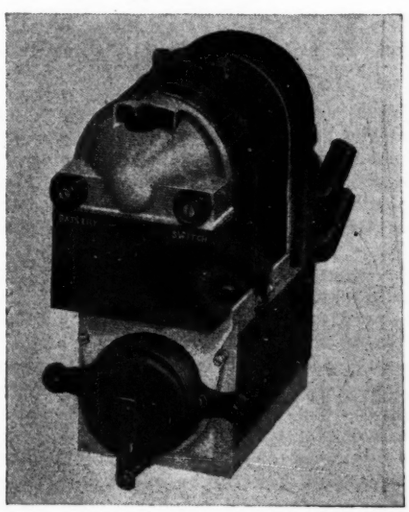
Like other Bosch high-tension magnetos the type ZR generate their own high-tension current directly in the magneto armature. Two permanent magnets are used for the field and the primary and secondary winding are on the one armature shaft. The primary winding consists of several turns of comparatively heavy wire, while the secondary is composed of very fine wire. The rotation of the armature between the poles of the magnets sets up a current in the primary circuit, and this is augmented further at every 180-deg. revolution of the armature shaft by the abrupt interruption of the primary circuit by the interrupter. At the opening of the primary circuit the resulting discharge of current from that circuit induces a current of high voltage in the secondary. The high-tension current thus created is collected by the slip-ring on the armature and passed to the slip-ring brush, then to all the various distributor terminals, each of which is connected by cable to the spark plug in its respective cylinder.

The instruments are protected by a safety spark gap. Under ordinary conditions the current will follow its normal path to the spark plug, but if for any reason the resistance in the secondary is increased to a high point, when, for instance, a cable becomes disconnected or a spark plug gap is too wide, the high-tension current will jump across the safety spark. Bosch Magneto Co., New York.


AND THE EAZE AND GRACE WITH WHICH MY "NO-MAN" TOP SLIDES INTO PLACE BRINGS JOY TO THE HEART OF EVEN THE MOST CRITICAL PEDESTRIAN ONE TOUCH – ONE SHAKE OF THE FINGER STARTS HER ON THE WAY

Eisemann

The main changes in the Eisemann magneto consist of the adoption of a rocker-arm type breaker as distinct from the spring style formally used and the adoption in all types of the unit-cast style of housing. The latter forms an oil-, water- and dust-tight protection for the vital elements. Further, since it now can be bored out and machined in one piece and because of its rigidity, it is possible to hold more closely the running clearance between the armature and pole-pieces. This tends to give increased magnetic efficiency and, as a result, a hotter spark.



Eisemann magneto and generator

The new contact breaker consists of a brass disk fastened in a cone in the end of the armature and carrying the mechanical and electrical elements on its outer face. On this face is a stationary insulated contact block, connected with the end of the primary winding by a screw which holds the entire breaker and which carries the fixed platinum contact screw. Operating against this screw is another platinum contact attached to a bell-crank lever. The latter is actuated by a fiber block riding over two flat steel cams in the timing lever body. The contacts are kept closed normally by a flat spring, which also grounds the rocker arm and, consequently, the moving platinum contact. There is an improved form of distributor plate on the four-cylinder instrument in which the screws for fastening the cables are exposed to view alongside the carbon brush holders.

The armature of Eisemann magnetos is of the shuttle type and mounted on ball bearings. The magnets are placed conventionally. The pole-pieces are wedge-shaped with their thickest part at the middle of the armature. This is said to concentrate the lines of force at one point, given increased intensity of spark. Eisemann magnetos are made for engines of from one to any number of cylinders, with manual or fixed spark control. The mounting and drive of many of the instruments are interchangeable with any magneto. There is a special outfit for Fords, consisting of the regular type GS4 mounted on a special bracket. A key switch for the dash is included.

The new Eisemann magneto-generator

takes care of lighting and ignition. This device is unusually compact inasmuch as it combines the generator with the magneto making it a single installation which is interchangeable with the regulation magneto on a car. This mechanism utilizes the regular magneto driveshaft, the magneto bracket and even the same fastening screws. It is interchangeable with the standard magnetos on the market without requiring any change on the drive or bracket. The generator which is directly above the magneto is an absolutely independent unit. It is made for 12- and 6-volt systems. The generator field coil is compound-wound with the shunt coil normally exciting the fields. The single-wiring system is used, and a switch panel in dull black is furnished. Eisemann Magneto Co., Brooklyn, N. Y.

Berling

Berling magnetos are of the high-tension rotating armature type. They are made in more than twenty models, ranging from a one-cylinder instrument to an eight-cylinder airplane type. Models S, E and F are for motor car use while D and DD are adapted especially for aircraft work. Berling magnetos are of the inclosed type of construction, being oil-, water- and dustproof.

The cams which operate the interrupter are integral parts of the interrupter housing, and cannot come loose. The interrupter can be inspected while the magneto is running. It also can be adjusted easily simply by loosening an ordinary screw. The latter has a hexagon head and is adjusted by a combination wrench and gage, provided for the purpose. The armature is mounted on ball bearings. All Berling magnetos have oil cups of ample size. Drain holes also are provided to prevent flooding the armature in case too much oil is applied.

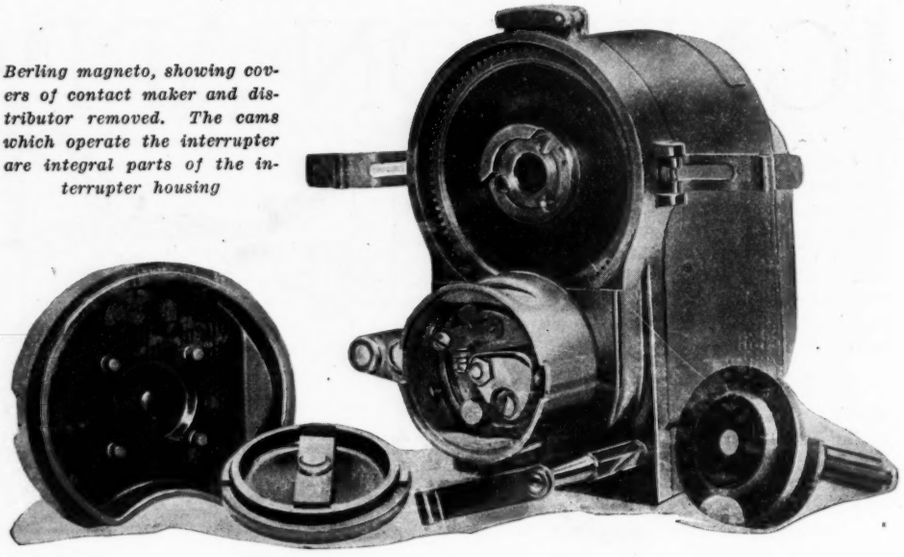
Practically all types of Berling magnetos can be provided with dual ignition. This is accomplished by providing a dual yoke with two terminals which permits the high-tension current from the coil and battery being connected to the magneto distributor. In addition to this yoke a battery timer is incorporated in the cam housing, which incloses the magneto interrupter. The two systems are practically independent, as the only part in common is the magneto distributor. The failure of either unit does not affect the other unless a complete mechanical breakdown occurs. The Berling dual system has both vibrating and non-vibrating types of coils. The running operation of both is the same, the difference being in the characteristics of the starting spark. The vibrating coils provide a succession of sparks during the interval the timer contacts are open, while the non-vibrating coils deliver but one spark. The vibrating coils provide a more certain starting ignition as the succession of sparks serves to raise the temperature of the gases to the flash point, if the mixture is poor. Ericsson Mfg. Co., Buffalo, N. Y.

K-W

The K-W magneto is furnished in six models, suitable for motor cars, stationary engines, airplane engines and small tractor engines. For large slow-moving tractors and stationary engines there are four models, H, HK, H-T and HTK. The former two have four magnets and the latter two five. The HK and HTK are practically the same as the other types but are fitted with an impulse starter for hot starting spark. The impulse starter allows the engine to be started regardless of the cranking speed, as the rotor is held stationary while the coupling is moving 80 deg., then is tripped and thrown ahead at the rate of 500 r.p.m., assuring, it is said, a very hot spark for starting.

After a predetermined engine speed has been reached, the starter coupling automatically is thrown out of engagement and the magneto is driven direct. It also eliminates any chance of a backfire, as the relation of the piston position to the firing point of the magneto is controlled by the starter until it has been thrown out of engagement, when it is controlled by the circuit breaker.

For engines that are hard to crank the company furnishes the model TK magneto, ranging from the one-cylinder type to six. The model T magneto is for motor cars, airplanes and small tractors and is furnished in sizes from single-cylinder to twelve. It is of the inductor-type construction, having stationary winding and only one revolving part, the rotor. This does away with moving wires, brushes, etc. K-W Ignition Co., Cleveland, Ohio.



Berling magneto, showing covers of contact maker and distributor removed. The cams which operate the interrupter are integral parts of the interrupter housing

Dixie

The Dixie magneto is not changed materially from last season and is furnished for engines having from one to twelve cylinders. These magnetos operate on what is called the Mason principle, in which the rotating poles revolve between the field pieces. Rotating between the limbs of the magnets, these two pieces of magnetic material form true extensions to the poles of the magnets and are therefore always of the same polarity. When the magnet poles rotate the magnetic lines of force from each magnet pole are carried directly to the field pieces and through the mass of the rotating member and with only a single air gap. The rotating member consists of two pieces of magnetic material separated by a non-magnetic center piece. The bearings for the rotating poles are mounted in steel plates, which lie against the poles of the magnets.

There are no revolving windings, and further simplicity becomes apparent when it is found that the circuit breaker, instead of revolving, is stationary and the whole breaker mechanism is exposed by turning the cover spring aside and removing the cover. With the dust- and water-protecting casing removed and one of the magnets withdrawn the winding can be seen with its core resting on the field pole-pieces and the primary lead attached to its side. An important feature of the high-tension winding is that the heads are of insulating material and there is no tendency for the current to jump to the side. The high-tension current is carried to the distributor by an insulated block with a spindle, at one end of which is a spring brush bearing directly on the winding, thus shortening the path of the high-tension current and eliminating the use of rubber spools and insulating parts. The condenser is placed directly above the winding and easily removed by taking out two screws. Splitdorf Electrical Co., Newark, N. J.

Simms

There have been no radical changes in the Simms high-tension magneto. Its important feature is the design of the pole-pieces. There are extensions on the edges which follow direction of rotation of the armature. The effect of these extensions is to keep the edges of the armature in the field of the pole in all positions, from full advance to full retard. At the moment the current is broken the edge of the shuttle is close to the edge of the pole piece. With the special contact breaker used on account of the bell-crank lever, it is not affected by speed, for at high speeds the centrifugal force on the breaker arm tends to keep the points closed. This means a very rapid breaking of the primary circuit. The timing lever cam is made in one piece and ground to size. Under ordinary conditions the magneto will give good results in starting, though to make possible an auxiliary system, the company offers a dual attachment which can be easily installed. Simms Magneto Co., East Orange, N. J.

Kingston

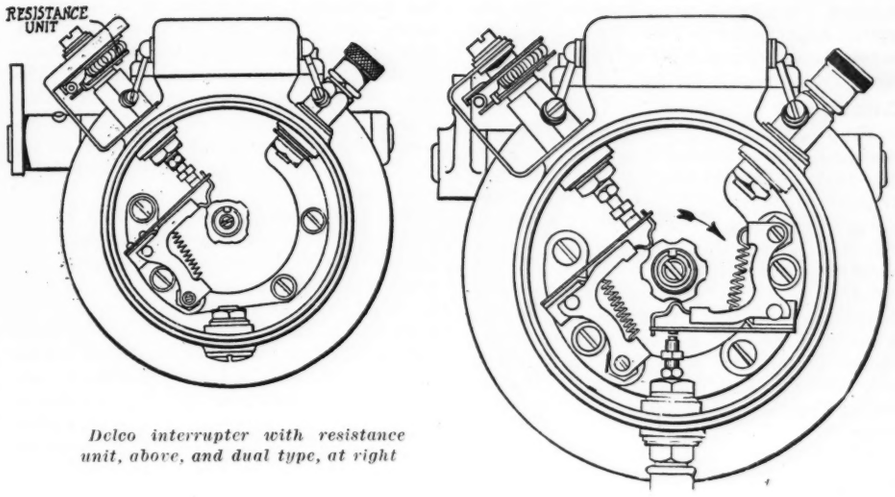
The Kingston magneto can be had in three types, all of the high-tension variety. The models are known as the MD, LD3 and LD. The latter is adapted specially for motor car work. It is made up with two permanent magnets and can be used on engines having two, three, four and six cylinders. The LD3 model is of the same general construction as the former, but instead of two magnetos has three. The MD is for engines having one or two cylinders. The armatures on all Kingston magnetos are of the shuttle, or H type, with laminnated centers. The Kokomo Electric Co., Kokomo, Ind.

Berkshire

The Berkshire magneto follows to a great extent the operating principles of the Dixie. One Berkshire model is of the four-spark-per-revolution type, which is run at half crankshaft speed in a four-cylinder engine and three-quarter speed in a six-cylinder. These types may be made to operate with eight and twelve-cylinder engines with alterations in the gearing and distributor head. Two-spark machines also are made. There are no carbon brushes evident in the distributors, the current being taken through brass cylinders projecting from a revolving cylinder of Bakelite. The rotating armature is of aluminum and iron. Berkshire Mfg. Co., Pittsfield, Mass.

Swiss

The entire housing of the Swiss magneto is in one piece, with the exception of the front ball-bearing support, which is necessary to install the armature. Essentially the armature is the same as has characterized all Swiss magnetos. A new six-cylinder model has been added to the line and like the other instruments is of the pure high-tension type. There is a new interrupter, said to be perfectly balanced, so that it is capable of very high speeds. It is stated that the interrupter is capable of delivering over 10,000 sparks per minute. The four-cylinder models, as well as the new six, conform to S. A. E. standards and can be furnished with a 38-mm. shaft, as well as a 45-mm. shaft. Inasmuch as the instrument is entirely inclosed in the one-piece housing, it is water, oil and dust-proof. Swiss Magneto Co., Monroe, Mich.



Delco interrupter with resistance unit, above, and dual type, at right

Battery Ignition Systems

Atwater Kent

There are no radical changes in the Atwater Kent battery systems for 1918. The company furnishes closed and open circuit systems known respectively as the model CC and K-2. In the type CC system the interrupter mechanism with the condenser is mounted on a plate with the shaft and cam protruding vertically through the center. The distributor head has practically the same construction as before and uses a rotating arm with spring contact on top and a nickel piece at the end to pass the current through the air gap to the contacts. From the latter the current goes through the wires to the plugs. On the Atwater Kent system all parts that are not of metal are Bakelite. The whole mechanism is simple and the arm carrying the moving contact is small.

In the closed-circuit system the outfit consists of a distributor unit with condenser and interrupter, cylindrical coil mounted close to the distributor unit and a switch. These units are mounted on a standard base so that they can replace magnetos of all types. The K-2 and CC systems differ mostly in the manner of producing the spark. In the new system the interrupter is closed, save when the spark is produced, when it is open. The reverse is true of the open-circuit types. Also the current consumption of the type CC decreases as the engine speed increases, while in the K-2 outfit it increases as the speed increases. The maximum current consumption of the former is reached when the engine is stopped, while in the latter the maximum is had when the engine speed is highest.

The company furnishes a special outfit to be installed on Fords, consisting of an elevated distributor head and drive mechanism, coil with switch, wiring, etc. Atwater Kent Mfg. Works, Philadelphia, Pa.

Connecticut

A few new switches have been added to the Connecticut ignition line for this season, otherwise the outfits are identical with last year's. This instrument is of the stationary type, in which there is no movement of any of the wires connected to the igniter. The distributor is made with waterproof self-contained terminal connections which are pushed into sockets forcing the rubber insulation against the side wall, thus sealing the opening. The distributor case is ventilated to prevent harmful effects from gases formed by the passing of the high-tension current and this ventilation is accomplished without interfering with its waterproof construction.

The casing is so designed that the breaker points can be removed easily. In this matter it is simply necessary to remove the distributor head without disconnecting the wires, slip off the distributor arm, disconnect one wire from the coil, remove two screws and the breaker plate can be removed from the housing. This does not affect the timing. The Connecticut ignition system is adaptable to engines from four to twelve cylinders. The automatic spark advance feature with which most of the systems are fitted gives the proper advance for each style of engine. Some of the small high-speed engines require very little spark advance, and therefore the automatic feature is omitted. Manual control is fitted in addition to all systems also.

The housing carrying the complete igniter and gear is so built that it can be slipped into a clamp socket for supporting it on the engine. The coil supplied with the distributor is built so that the voltage is sufficiently high to jump the gaps in the plugs even though the latter may have excessive gaps. It also is stated that the current from the secondary is strong enough to ignite the mixture when the plug gaps are only 1/50 in. Connecticut Telephone & Electric Co., Meridian, Conn.

New York Coil

A new type of ignition system, called the Vibrator-Les, has been placed on the market by this concern, in which a non-vibrating coil is used, taking its energy from the untimed Ford magneto. Vibrator-Les ignition works equally well on dry cells or storage battery and provision is made for using them. The system is installed by removing the present timer and replacing with the elevated gear bracket upon the top of which is mounted the high-tension distributor. The present Ford coil box and all four units are discarded, and in its place is installed a panel containing a two-point switch with removable key.

The new non-vibrating coil or transformer is secured to the front of the engine by two foot clamps that hold the manifolds to the cylinder block. All cables and wires are furnished connected in the proper firing order to the instrument.

Details of the Vibrator-Les distributor mechanism are shown in the illustration. Under one end of the armature D is a magnet E, connected in series to the primary of the coil. The part C serves normally to keep the contact apart by spring action. There is a slot in the upper end of the main shaft and four steel pins so arranged that when the engine revolves raise the part C and allow the armature to make contact with the adjusting screw H. After the pin backs off from C the armature is separated from the contact screw and held

against the magnet core, breaking the circuit. Adjustment is made by turning the screw L in or out. New York Coil Co., New York.

Kingston

The Kingston battery system is simple in design, neatly constructed and has few moving parts. The contact points in the distributor head are opened by a specially ground steel cam, which is moved easily on the shaft for timing purposes. The main shaft and contact lever bearings are fed by wick oilers. This system is said to be adapted especially for motor car service where a generator is used continually to charge a storage battery. It uses the battery current which passes through the coil, circuit breaker and distributor to the spark plugs.

The switch is of the progressive type and the key turns in a clockwise direction only. It is arranged so that the direction of the current flow through the circuit breaker is reversed at each contact. The distributor head and drive are mounted on one base with the coil, and the outfit is arranged so that it can be conveniently installed on the conventional magneto bases. New York Coil Co., New York.

Philbrin

The Philbrin ignition system is both a single and continuous-spark system. Either type may be used at will. The chief feature of the Philbrin system is the breaker, which supplies a spark of great intensity at all engine speeds.

The operation of the breaker is as follows: Rotation of the cam C, which is in effect a series of tiny triggers, pushes out the arm A, thus closing the contacts, normally open. When a trigger passes the arm the contacts are separated by the spring S instantly. If the cam is rotated the wrong way the triggers simply push the arm A out of the way. The continuous spark is controlled not by the breaker mechanism but by a tiny vibrator of special form contained within the switch assembly. The vibrator operates at four to five times the speed of the ordinary type. The distributor has a long arm with a peculiar face and does not touch the high-tension terminals molded into the Bakelite cover but passes in close proximity to the terminals.

The switch provides for two sources of current, storage battery or dry cells. The lever which controls the operation of the continuous spark and single-spark operation is a small continuous rotary plug. This plug is marked alternately M and S, signifying whether the main or secondary systems are in operation. It also reverses the polarity of the circuit each time it is turned. The ignition coil is mounted in a waterproof case and may be mounted on the dash or directly with the distributor unit. There is but one adjustment, that of the contact points. The vibrator for the secondary system is housed in the switch assembly and needs no adjustment. Phillips-Brinton Co., Kennet Square, Pa.

Westinghouse

The Westinghouse battery system operates on the closed-circuit principle. The unit operates in a vertical position and its shaft is driven from the cam or magneto shaft through gearing. The breaker mechanism is mounted beneath the coil, while the distributor mechanism is mounted directly above the coil. In operation, rotation of the cam separates the contacts against the action of a small spring. The cam is mounted loosely on the shaft, but a small pin in a collar on the shaft against which the cam rests enters a hole in the cam and provides the necessary driving connection.

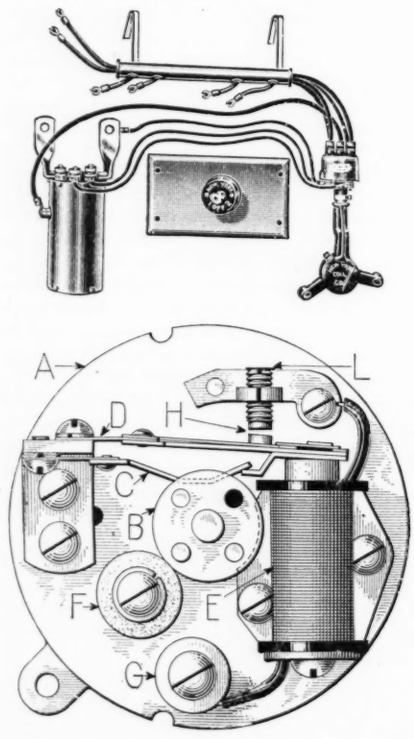
The condenser is mounted close to the breaker mechanism in a compartment cast integral with the main base plate. The condenser, breaker and coil are inclosed in a tube of Bakelite, which forms the body of the unit. The distributor is fitted with a circular carbon brush which makes contact with the various terminals in the cover. One terminal of the secondary winding of the induction coil is connected to the carbon distributor brush by a metal ring mounted on a disk of insulation directly above the coil. The carbon brush extends through the end of the distributor arm and rests on the upper surface of the metal ring, which is connected electrically to the end of the secondary winding.

The ignition switch is of the snap type and combines the lighting switch in one plate mounted flush on the dash. Each time the switch is turned the polarity is reversed. A ballast coil is mounted on the back of the switch and its function is to protect the winding and prevent heavy drain on the battery, should the engine happen to remain idle with the switch in the on position. Westinghouse Electric & Mfg. Co., Pittsburgh, Pa.

Remy

The Remy system operates on the closed-circuit principle and is distinguished by the fact that it has but two moving parts, the cam and breaker arm. Another feature is that the whole mechanism is stationary; advancing or retarding the spark does not move any of the wiring. The distributor mechanism has no wiping contacts, the spark jumping from the radial distributor arm to the terminals and thus eliminating wear. A small resistance coil is located on top of the ignition coil and connected in series with the primary. This coil acts as a sort of ballast coil to save the battery from excessive drain. The protection is provided by the resistance of the coil increasing very rapidly when the current through it exceeds a certain value.

The breaker points are the only parts that require attention and these only about twice a season. A gage is provided for the purpose, riveted to the adjusting wrench. Remy Electric Co., Anderson, Ind.



New York Vibrator-Les ignition system, showing construction of distributor below

Pittsfield

The Pittsfield ignition system operates on the open-circuit principle. It differs from most systems in that the contacts are opened and closed mechanically, neither operation depending on the action of a spring. The breaker, distributor and coil are all a single unit and the systems are supplied for four-, six-, eight- and twelve-cylinder engines. Normally the contacts are open, but the rotation of a cam presses an arm carrying the lever contact up, thus bringing the contacts together mechanically with a firm pressure.

Further rotation of the cam brings it into contact with a fiber member on the end of the arm carrying the other contact, thus breaking the circuit. Removal of the cover and coil exposes the distributer mechanism and after the key holding the camshaft has been withdrawn the whole shaft can be lifted out when necessary. The only adjustment is that of the breaker points. Pittsfield Spark Coil Co., Pittsfield, Mass.

Delco

The later models of the Delco ignition systems operate on the closed-circuit principle. In this system an arm carries the movable contact which is normally in contact with a fixed contact. A piece of fiber is mounted on the arm and bears against the surface of the cam, being lifted by the projections of the cam against a small flat spring which is held by the inner wall of the housing.

The dual type of Delco interrupter has two independent sets of interrupter contacts, one for battery and one for magneto. The operation of this interrupter is the same as the other types, differing only in the double set of contacts.

Should the ignition switch be left closed, there is a likelihood that the interrupter might be left in the closed position and consequently the battery would continue to discharge. To prevent this a resistance has been introduced in the primary circuit. This unit consists of a small open coil of high resistance wire wound upon a porcelain spool. All the current passes through this resistance unit, but owing to the extremely short period it continues between interruptions, due to the opening of the contact points, the resistance wire remains fairly cool. When the ignition switch is left closed and the engine stops with the interrupter points closed the current is then continuous and of greater effective value and causes the resistance wire to become heated to a red heat in a very short time. At this high temperature the resistance of the wire is much greater

than at a lower temperature, so that it does not permit as much current to pass through the primary winding of the coil as would pass if the resistance of the wire remained unchanged. Dayton Engineering Laboratories Co., Dayton, Ohio.

Electrical Sundries

Tungar Rectifier

The new Tungar rectifier is a hot cathode, argon gas-filled device, and consists of a small glass bulb, similar to an incandescent lamp, in which the rectification takes place; a little compensator, or transformer, which reduces the alternating current without wasteful resistance; a fuse and an inclosing case.

The largest type is designed for use in public garages and service stations and has a capacity of 6 amp., 7½ to 75 volts. It will charge from one to ten three-cell storage batteries from a 115-volt, 60-cycle alternating-current circuit. A single three-cell battery may be charged by itself, or any number up to and including thirty cells. The controlling, devices including ammeter, switch and regulating handle, are located at the front of the case.

The small 2-amp. rectifier is amply large enough for private garages to charge a lighting and starting battery, but it requires more time than the 6-amp., 15-volt unit.

Tungar rectifiers are simply mounted on the wall or bench when it is convenient to connect it to the 110-115-volt lighting circuit. They are self-starting, light of weight and require very little room. If the alternating current should be shut off the batteries cannot be discharged through the rectifier.—General Electric Co., Schenectady, N. Y.

Aid Dim Switch

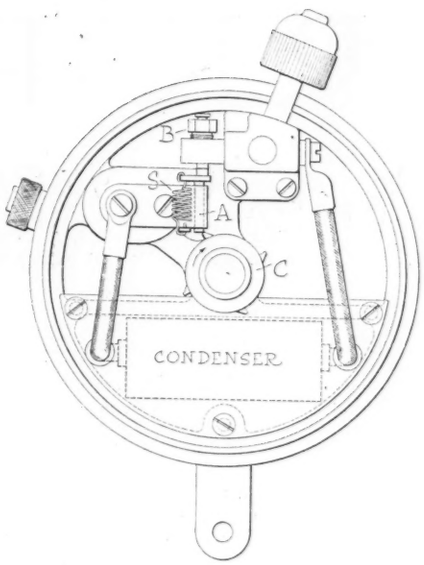
The Aid Dim switch for Fords is a double button switch and by pressing one button the lights are on or off and by pressing the other they are dim or bright. One need not use the regular Ford switch with this one. The device is clamped on the steering column under the wheel and requires no changing of wires to install. The two wires running from the switch are connected to the present Ford switch, running along the steering column. It is finished in black japan. Price, $3.50.—Aid Mfg. Co., Chicago.

Bill Spark Retarder

This device is automatic in action and eliminates danger from backfiring when cranking the Ford engine. Upon engagement of the starting crank it mechanically retards the spark to a point of safety, and upon the crank being disengaged when the engine starts, it readvances the spark to the proper operating position. Thus the driver can leave his spark lever set at the most advantageous position, although he may retard or advance it as the case may be at any time. The construction involves a flanged ratchet to take the place of the one originally on the starting crank, support on the engine and a lever going to the commutator. There are no complicated adjustments and the device can be installed by anyone with a few tools. Price, $3.50.—Bill Mfg. Co., Laporte, Ind.

Safety-Spark Set

The Safety-Spark set performs the function of setting the timer on the Ford to the point of easiest starting and also prevents injury from backfires. The spark cannot be advanced while the engine is being cranked, because the small fork rides on the ratchet and holds the timer in place. Once the timer is set the device does not interfere with cranking. It can be attached to the car without changing a part and requires no drilling. It is simply clamped to the commutator and requires about 10 min. to install. Price, $1.50—Safety-Spark Set Co., Elkhorn, Wis.



Plan view of Philbrin distributor head

B-W Tester and Ammeter

The B-W tester is for testing Ford coils. It consists of a wood base on which is mounted a low-reading ammeter, receptacle, contact springs for holding the coil, two binding posts for connecting on a 6-volt storage battery or four dry cells in series, an adjustable spark gap and switch for making or breaking the circuit. The gap takes the place of a plug in the engine. The coil to be tested is placed so that the springs on the base touch the proper terminals of the coil. The battery then is connected and the switch closed. If the ammeter gives a fairly steady reading of about 1½ amp. and a continuous string of sparks follow across the gap, the coil is in good condition. Faulty coils are detected by noting the ammeter readings, at the same time turning the adjusting screw of the instrument. Price, $6.

The B-W direct current ammeters come in either the surface or flush types and in nickel or black finish. The scales are furnished with zero center and calibrated in amperes each way. To the right is marked charge and to the left discharge. It is stated that even with a heavy overload of three or four times the capacity of the meter, the B-W is not affected either in calibration or zero position. Price, $1.90. —Ballman-Whitman Mfg. Co., St. Louis, Mo.

Becker Brushes

A new line of starter and generator brushes has been added by this concern to its line of electric motors, generators, etc. These brushes are supplied in various styles and shapes to meet nearly every demand. They are furnished in metal, gauze and carbon and variously priced. — Becker Brothers, Inc., Chicago.

Ambu Trouble Shooter

The Ambu trouble shooter is a combination volt and ammeter which by means of a special scale, enables one to locate trouble in an electrical system without difficulty. The instrument is adaptable to any American starting and lighting system and with the instrument there is an exact layout of the wiring system of each car, being altogether wiring diagrams for about 400 different cars. The instrument operates on the principle of systematic elimination for the location of trouble in an electrical system. American Bureau of Engineering, Inc., Chicago.

Break-Not Battery Tester

The Break-Not battery tester is a syringe hydrometer which is well made and should prove of value to any owner or service station. Price $1. E. Edelman & Co., Chicago.

Miscellaneous

Hindview Mirrors

Hindview mirrors are furnished for every make and style of car and truck, for straight windshield on touring car, for closed cars, for roadsters and small cars and for trucks. Prices vary according to style.—Kales Stamping Co., Detroit.

Boyce Moto-Meter

The Boyce Moto-Meter is a device for indicating the engine temperature by contact with the cooling water in the radiator. This is accomplished by attaching the thermometer to the radiator cap and allowing the bulb of the instrument to project into the water. Several types are made, varying in price as follows, the Midget instrument for $2.50, the junior for $5 and the standard model for $10.—Moto-Meter Co., Inc., Long Island City, N. Y.

Freezometer

The Freezometer is an instrument intended to indicate the condition of the anti-freeze solution in radiator. The instrument is very similar to an acid hydrometer. It is graduated from 30 deg. above zero to 50 deg. below zero Fahr.—E. Edelmann & Co., Chicago.

Basline Autowline.

The Basline Autowline is made from about 25 ft. of ¼-in. wire rope with special snaffle hooks at each end. The weight of the line is 4½ lb. and it will roll up in a small enough size to permit being carried under the seat. The line is also made in a heavier size for use with trucks.—Broderick & Bascom Rope Co., St. Louis, Mo.

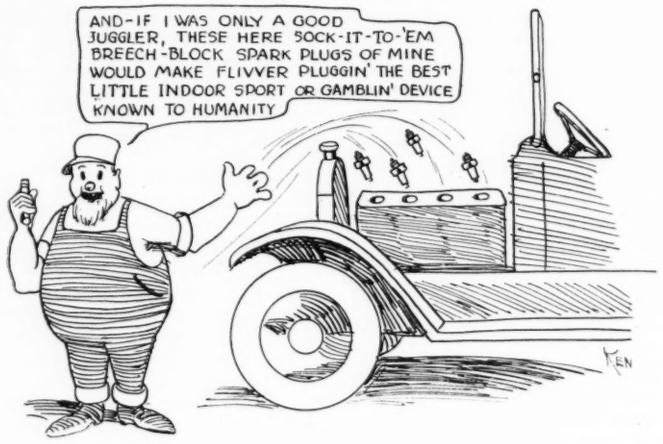
Dunn Counterbalances

The Dunn crankshaft counterbalances are made especially for Fords, the object being to relieve the bearing pressure in the engine and also to reduce engine vibration. The weights consist of two parts which are made so that they can be bolted onto the cheeks of the crankshaft by two bolts for each counterweight. Price $12.50.—Dunn Counterbalance Co., Clarinda, Iowa.

SPARK PLUGS

AC

The Champion Ignition Co., Flint, Mich., is continuing its line of AC Titan and Cico plugs without change and in addition has added during the year two new types, the Aviation and the Carbon-Proof. The Carbon-Proof, which is the latest to be perfected, was designed primarily to overcome carbonizing trouble in a kerosene-burning tractor and is offered now for Ford, Overland and Studebaker cars. It consists of a plug with a porcelain fitted with ribs having sawtooth edges which attain a sufficiently high degree of heat to burn away the carbon, thereby keeping the edges free from deposits and breaking up any possible short-circuits. The entire line includes more than twenty-five distinct types. The regular Titan plugs sell for $1 and the Cico for 75 cents.


AND-IF I WAS ONLY A GOOD JUGGLER, THESE HERE SOCK-IT-TO-'EM BREECH-BLOCK SPARK PLUGS OF MINE WOULD MAKE FLIVVER PLUGGIN' THE BEST LITTLE INDOOR SPORT OR GAMBLIN' DEVICE KNOWN TO HUMANITY

Answer

The Answer spark plug is a one-piece mica plug without the gaskets or bushings. The center conductor is wedged into many thin sheets of mica which are said to prevent possibility of short-circuit because the fine mica sheets insulate every part of the center electrode from contact to sparking point. The electrodes are of special alloy wire designed to prevent burning. Regular sizes sell at $1, the Ford size at 75 cents. Hill Insulating & Mfg. Co., New York.

Auburn

The Auburn line of plugs consists of three, A.I.M. porcelain, A.I.M. mica and the Blazer, an extra heavy plug with an unusually heavy center electrode. The plugs continue unchanged except for heavier insulators. The Blazer is insulated with fireiete, a stone composition said to be 40 per cent stronger than porcelain and with double the insulating quality. The porcelain plugs sell for 75 cents and the others for $1 each. Auburn Ignition Mfg. Co., Inc., Auburn, N. Y.

Benford

The gold-plated spark plug introduced last year as Benford's Monarch Golden Giant is continued with the insulator of blue adamant, which will not break under any heat, it is claimed. The gaskets are special copper asbestos, and the electrodes are of pure nickel. The price is $1. The Monarch Reliable, a porcelain plug, sells for 75 cents. Benford Mfg. Co., Mount Vernon, N. Y.

Bergie

A 1-in. firing surface composed of two looping wires, one on each side of the center electrode, features the Bergie spark plug. It is claimed that this construction gives a flame equal to from seven to ten sparks generated by a plug with a single point. The porcelain has extra thick walls and is supported on a copper gasket which gives tight compression. The skirt of the porcelain extends well down into the shell as a protection against short-circuiting and carbon formation. Price, $1. Bergie National Spark Plug Co., Rockford, Ill.

Bethlehem

The De Luxe spark plug has been added to the Bethlehem line. It is insulated by mica. The shell and cap are finned to aid in heat radiation. The shell is of steel and the cap of polished brass. This is a design for racing cars and aviation, truck, tractor and marine engines, where intense heat and unusually high compressions must be withstood. Silvex Co., Bethlehem, Pa.

Blitz

The Blitz spark plug has a mica foundation completely covered with a porcelain shell which protects the mica from oil. An outer jacket of tough porcelain is placed over this assembly. The assembly results in offsetting the disadvantage of the mica in its tendency to absorb oil and the disadvantage of porcelain in its fragility. Randall-Faichney Co., Boston, Mass.

Champion

A Champion heavy-duty plug has been added to the line of more than fifteen different types, ⅞-18 with 1⅛-in. hexagon. The new type is for such engines as Packard, Peerless and Cadillac. It is a one-piece structure, the top of the shell being turned over the shoulder of the porcelain by an intense heat and air pressure to prevent any possibility of leaking. The continued models include those of special design for Ford, Studebaker, Overland, Buick, Metz and others. Regular sizes are in ½, ⅞ and ⅛ in. and metric. In addition to the spark plugs a priming plug is offered, by which priming liquid is brought directly to the firing points. Champion Spark Plug Co., Toledo, Ohio.

Bosch

The Bosch spark plug has an insulator of steatite, an artificial stone which will not crack at any temperature found in an engine. The plug has three principal parts, a heavy central electrode, a single insulator and a steel shaft. All are made up as one piece. The three electrodes are heavy enough to withstand the most intense magneto spark. The knife edges of the electrodes cause the spark to pass as a sheet instead of a ball, giving the least possible resistance to the current. Bosch Magneto Co., New York.

D & D Fouless

The D & D Fouless has a ball between the electrode that continually is jumping, keeping the points perfectly clean. The plug has two sparks, one from the center electrode to the ball and the other from the ball to the terminal. This action intensifies the spark with a resultant fat spark. It is claimed that it will fire an unusually lean mixure. Price, $2. D. & D. Co., Chicago.

Derf

The core of the Derf spark plug is composed of a composition known as Lavaette which is said not to be affected by the most severe heat, speed or high compression. The center electrode terminates in a disk of 360 points' ignition instead of a single spark and is self-contained instead of being cemented to the core. The effect of the rapid and hot spark is to burn up the oil and carbon so the sparking points on the circle are always clean. Price, $1.50. Derf Mfg. Co., New York.

Eklips

The Eklips is made in three types, with porcelain insulators. The plugs are made

in all standard sizes including metric. Three sparking points insure an intense flame. The heavy-duty model is called the Giant and sells for $1.25, while the regular Eklips is $1 and the Eklips C, 50 cents. The ground terminals are bent to keep oil from flowing toward the spark gap, keeping it clean. Fulton Co., Milwaukee, Wis.

Express

Express spark plugs make use of capillary attraction at the electrode to prevent bridging of oil and use a special design of insulation to prevent short-circuits on the inside and current leakage on the outside. Porcelain insulation is used, and the insulator is retained in the steel shell by a heavy brass gland. Price, $1.50. Express Spark Plug Co. of America, Washington, D. C.

Hampshire

The Hampshire spark plugs are named Wizard, Rival and Diamond Z. The plugs are made in standard and metric sizes and as specials. The insulation is porcelain and mica and the sparking points are from high-grade nickel alloy with a high melting point and guaranteed to withstand excessive heat without disintegration. There is a special Wizard priming plug in which gasoline is admitted through a priming cup directly to the sparking points. Hampshire Mfg. Co., Hatfield, Mass.

Hercules

The Giant has been added to the Hercules line of spark plugs this year, which is featured by a spring gland that slips over the porcelain beneath the outer lock nut, its lower flange riding the top of the tapered shoulder and absorbing contraction and expansion through its sliding spring action. The Giant is a heavy-duty type selling at $1, while the Hercules Junior is made with a $\frac{15}{16}$ in. shell instead of 1⅛ in. and sells at 75 cents. A special tractor model is furnished at $2. The Giant has two ground electrodes, and the Junior has one. Eclipse Mfg. Co., Indianapolis, Ind.

Stewart V-Ray plug, left and Reflex, right

Herz

The Bougie Mercedes and Pro-Mo-Tor are continued, the first being for every engine and the latter for the Ford. The main feature of the Herz plug is the patented construction of the cloverleaf electrode of platinum alloy behind which is an inner combustion chamber. Each explosion blows out the soot and oil, making the plug self-cleaning. At each explosion a flame shoots out of the inner chamber, causing a complete combustion of all gases even for the leanest mixture, it is claimed. Insulation is by blue enamel stone tested up to 2000 deg. without cracking. Herz & Co., New York.

J-M Mezger

Short-circuiting is impossible, it is claimed, with the J-M Mezger Soot-Proof plug. A petticoat porcelain insulator makes a deep chamber between the center electrode and the porcelain and between the porcelain and the body of the shell. These chambers act as auxiliary combustion chambers. As ignition occurs the compressed gas contained in the chambers is ignited and expands tremendously. The outrush of the burning gas has a scouring effect on the porcelain and prevents the formation of an excessive amount of carbon. H. W. Johns-Manville Co., New York.

Jumbo

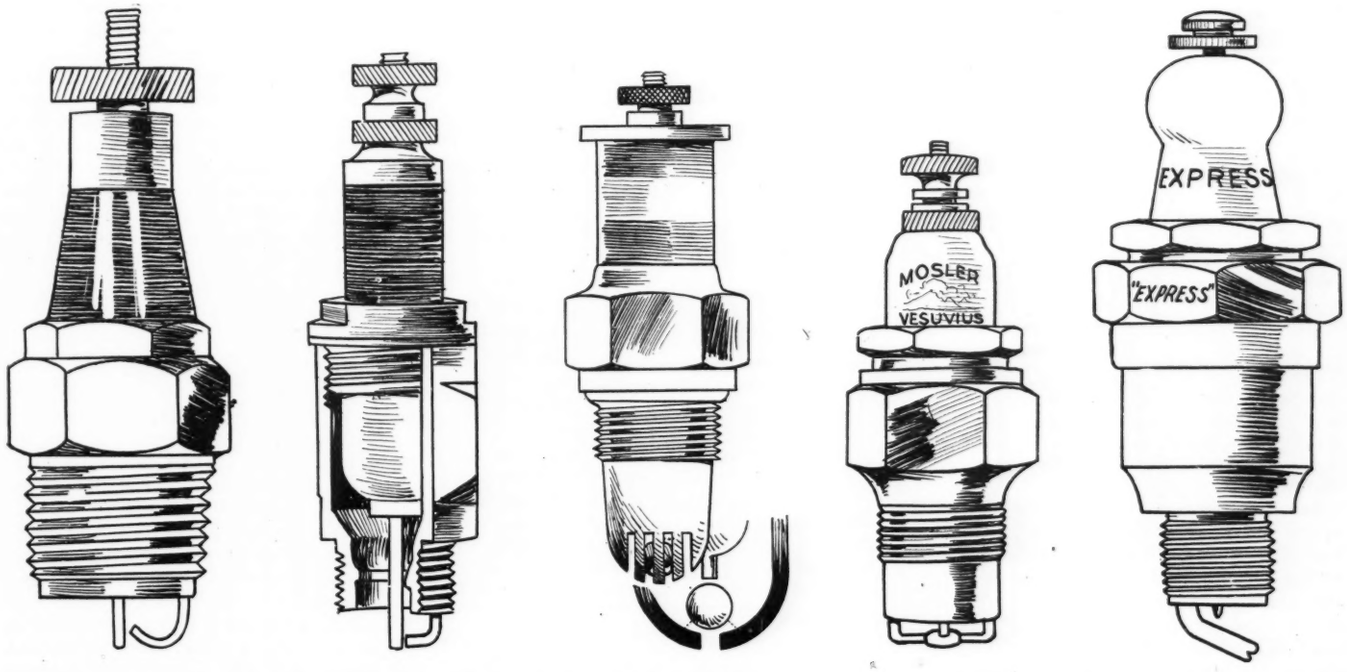
The Jumbo Jiant has been added to the previous three models, Jumbo Molite S.A.E., Jumbo Molite Ford special and Jumbo Molite A.L.A.M. The name "Molite" is from the insulation consisting of vitrified lava product with 20 per cent greater dielectric strength than that of glazed porcelain and a much greater voltage without mechanical damage or reduction in insulating property. The electrodes are sloped toward the points of contact so oil is kept away from the sparking points. Prices range from 75 cents for the Ford type to $1.25 for Jumbo Jiant. Gibson-Holister Mfg. Co., Jamaica Plain, Mass.

Kingston

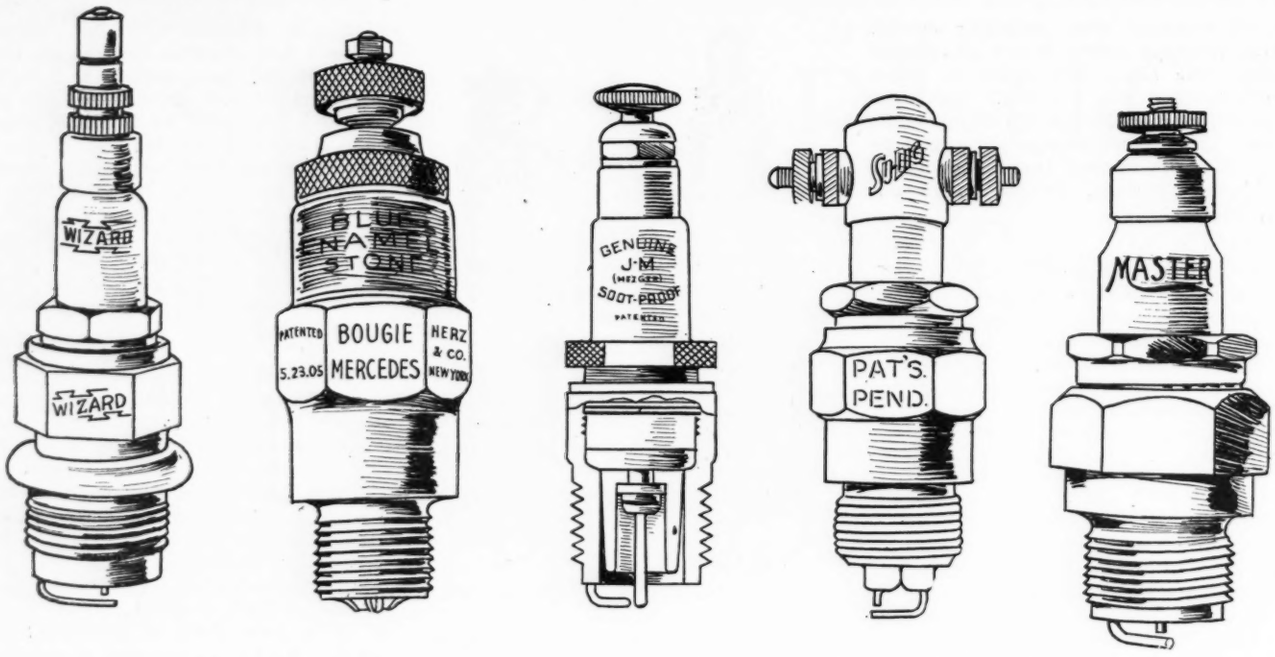
Kingston plugs are insulated with mica and are made in all sizes. Prices for the ⅞, ½ and metric thread sizes are 75 cents. The ¾-in. size sells for $1.75. Kokomo Electric Co., Kokomo, Ind.

Kopper King

The Kopper King spark plug is designed to be rust- and carbon-proof. Heavy plating of the copper prevents rust, and it will not accumulate carbon because carbon does not adhere to the plating, it is claimed. There is a generous thickness in all metal parts, and the gaskets are copper-covered asbestos. The plugs are furnished with universal terminals and are made in all



Five spark plug makes, reading from left to right, Kingston, Sootless, D & D Fouless, Mosler Vesuvius and Express



Reading from left to right, the spark plugs are Wizard, Bougie Mercedes, J-M Sootproof, Su-Dig and Master Calorite

sizes. Sharp Spark Plug Co., Cleveland, Ohio.

LaFrench

The newest feature of the LaFrench spark plug is the insulator, which is composed of Nixite, a composition inserted inside an independent steel shell and specially adapted for high-compression engines. The plug is arranged to take the current with the least possible resistance and is claimed to overcome troubles of broken porcelains and lost compression. Price, $1.25. LaFrench Power Spark Plug Co., Columbus, Ohio.

L-A and Sterling

Several plugs are offered under the name of L-A, while the same company makes others known as the Sterling, which are somewhat lower in price. The L-A Giant is a stone insulator plug with copper-lined steel bushings and copper-covered asbestos gaskets. Standard L-A plugs have large shells and porcelain insulators. The Sterling is smaller than the L-A and is offered in petticoat and conical models. Lockwood Ash Motor Co., Inc., Jackson, Mich.

Master Calorite

The insulator of the Master Calorite gives it the last half of its name. Calorite is a substance claimed to be able to withstand tremendous heat and abrupt changes of temperature without damage. Special plugs for Ford and Reo are supplied. Regular sizes sell for $1 each and the extra long and special sizes for $1.25. Hartford Machine Screw Co., Hartford, Conn.

Mosler

The line of Superior, Spitfire and Vesuvius spark plugs is continued, with the Vesuvius Dodge Brothers special and the Willys-Knight special. The Vesuvius plugs use a stone insulation known as Vitite, an American product developed to take the place of European Steatite. The continuous knife-edge electrode gives a ribbon of flame exploding all the gas. The electrodes are firmly anchored at both ends and cannot get out of adjustment. The Superior spark plug is for the Ford engine and also has Vitate insulation. The Spitfire uses mica. A Vesuvius mica tractor plug is offered at $2. Prices, Vesuvius, $1; Superior, 75 cents; Spitfire, $1. A. R. Mosler Co., New York.

Pittsfield

During the year an airplane type was added to the line of Pittsfield spark plugs, which carried over three designs from the year before. The airplane type anticipates development of great heat by its construction. The core is built up of mica washers and has square shoulders, which afford two gasket seats. When the core is clamped in the shell by a check nut it is centered accurately and a tight joint formed. This construction gives a shorter plug than with conical fits and is said to improve the heat radiation through the stem. The lower end of the shell has baffle plate perforations which prevents pocketing of burnt gases behind the plate and preignition of the new charge. The shell is finned to provide greater heat-radiating surface. Pittsfield plugs come in ½-in., ⅞-in. and metric sizes as well as in special sizes for various cars. Pittsfield Spark Coil Co., Pittsfield, Mass.

Rajah

Porcelain is used exclusively for insulating material on all Rajah plugs. Few changes have been made in the Rajah line for many years. A special plug is carried, differing from the stock plug in the construction of the center electrode from special material and the employment of copper flanges on the end of the electrode to radiate the heat more quickly. These plugs are for racing cars and airplane engines. Rajah Auto Supply Co., Blumfield, N. J., manufacturer, and Edward A. Cassidy, New York, distributor.

Push-Clean

The Push-Clean spark plug cleans itself. All that is necessary is to push a button on the top of the plug. The push cleans the porcelain and the electrode, and scrapes the side wires. A patented cleaning bridge on the bottom of the shell protects the sparking points and porcelain, besides making it possible to clean the plugs while the engine is running. Carbon and oil are removed from the porcelain by the cutters, the points of the side wires are cleaned and polished automatically, while oil and carbon are wiped off the center electrode by the bridge during the operation. Price, $2. Wellman-Howe Mfg. Co., Chicago.

Reflex

The principal differences in the types of Reflex plugs are in the construction and location of the electrodes. The baffle-type core is used on the inclosed-end plugs. The shell is constructed to provide for an inclosed combustion chamber with a full-circle spark gap in the end wall. Before the charge in the cylinder ignites the gas enters the combustion chamber in the plugs through the end wall. At each explosion a rotating motion is imparted to the ignited gases on the interior of the shell by a patented reflecting concave baffle of the center steel core. The open-end Reflex plugs utilize a petticoat-type core. Prices range from 75 cents for a special open-end Ford plug to $1.25. Reflex Ignition Co., Cleveland, Ohio.

Red Head

The addition to the Red Head line of last year, the Vitristone, has been developed, otherwise the line remains essentially the same. Vitristone is a new type of vitrified stone, the product of the factory's own potteries, and resembles material used in stoneware dishes which can be exposed directly to fire in an oven without cracking. Red Head plugs are manufactured for all types of engines, and eleven special models are made. The new plug is called a combination, the lower part of a mica core being protected by Vitristone. The line includes a combination spark plug and primer. Prices vary from 75 cents for the Ford size to $1.50

for the combination and priming rings. Emil Grossman Mfg. Co. Brooklyn, N. Y.

Sootless

The feature of the Sootless spark plug is a porcelain cap at the end of the core, which serves as a protector. The sparking point extends well down into the combustion chamber, and compression tends to tighten the plug parts, in which there is no packing. Insulation is mica. Standard and special sizes are supplied. Oakes & Dow Co., Boston, Mass.

Splitdorf

The Splitdorf green-jacket spark plug is continued without change. The jacket, which characterizes the plug, has nothing to do with the insulation but is merely a good-looking outer wrap for the mica insulation. The mica core is wrapped laterally in automatic machinery. The sheets are overlapped and built up preparatory to forcing in the bushing. Machinery cares for the setting of the core in the bushing and compresses the mica sheets until the mica between the spindle and the bushing becomes as solid as though one sheet. Splitdorf Electrical Co., Newark, N. J.

Stewart V-Ray

The distinguishing feature of the Stewart V-Ray spark plug is the four-point spark which insures an intense flame at all times. The points are of nickel-steel wire. The petriflint core, which is non-absorbent and practically fracture-proof, is another feature. The plug has a copper-asbestos gasket between the bushing and the core, and an asbestos packing between the center electrode and the core. All plugs have the universal terminal cap which fits practically every type of cable terminal. To clean the points it is only necessary to slip the taper end of the terminal on the center point and turn. The rasp-like surface scrapes the points, leaving them clean. Stewart-Warner Speedometer Corp., Chicago.

Tungsten

Only a few changes, and those minor, have been made in the line of Tungsten spark plugs during the last year. A heavier center stem is used now, and a few special types, such as the Dodge Brothers special, ¾-in. tractor and ½-in. extra long tractor plugs, have been added. Tungsten Mfg. Co., Marshalltown, Iowa.

Twin-Tact and Su-Dig

The Twin-Tact spark plug provides for two systems of ignition and is two plugs in one. It has two insulated sparking points, each of which is connected to its own terminal post, so a spark may be obtained from either point. A magneto may be connected to one terminal post and a battery system to the other and each operated separately. The Su-Dig has a special double electrode made to operate in series with the regular single spark plug, designed to give more power in both T and L-head engines. It gives two simultaneous sparks in each cylinder. Price, $1.50 each. Superior Motor Power Co., New York.

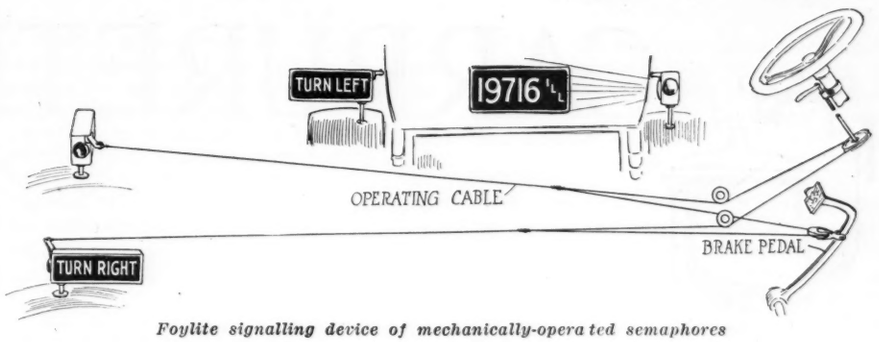
Twin-Fire

The Twin-Fire spark plug is featured by two distinct sparks, so that if one spark gap is short circuited the plug keeps firing through the other spark gap. Porcelain core, nickeled-steel bushing, copper-asbestos gasket and steel shell make up the Twin-Fire. The center electrode is nickel alloy, the intermediate electrode insulated by porcelain and the ground electrode of nickel alloy. Standard ½, ⅞-18 and ⅞ extension and metric sizes are offered at $1 each. Twin-Fire Spark Plug Co., Detroit.

Signal Devices

Roedding

The Roedding signal device is operated electrically and permits the driver to make known his intentions to those behind, by flashing suitable words on the surface of the cylinder of which it consists. The words are flashed in a window in the cylindrical metal container, through the operation of an electrical control button near the driver's hand. Price, $18.—K. G. Barkoop, Detroit.



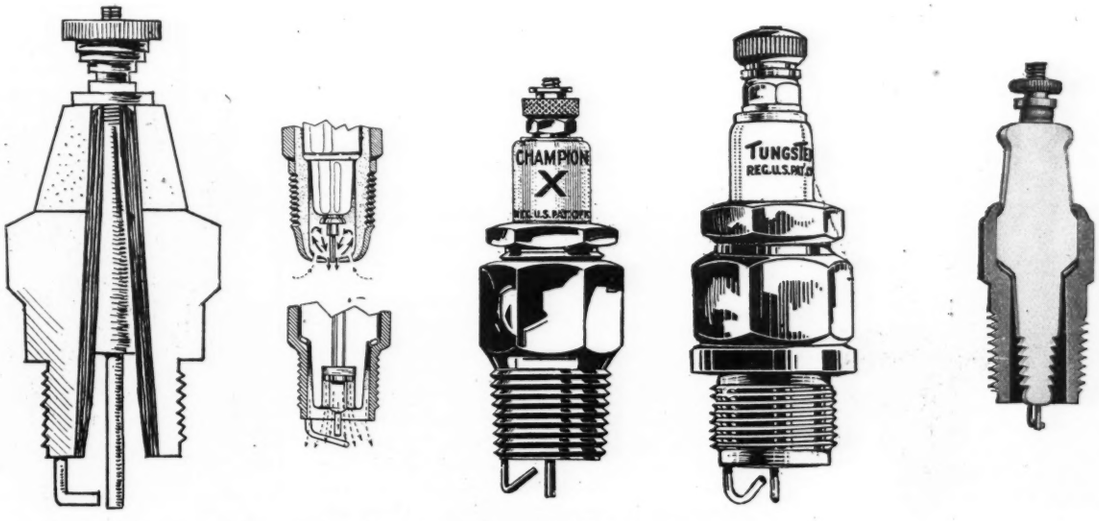
Foylite signalling device of mechanically-operated semaphores

Foylite

The Foylite signal device consists of mechanically-operated semaphores on the rear fenders which warn vehicles behind the car of the driver's traffic intentions. Operation is in conjunction with the brake system, and it is impossible for the driver to stop the car without first setting the semaphore by pressure on the brake pedal. Each semaphore is fitted with electric lights, and the right one eliminates the license plate. The steering post carries a small lever for swinging either semaphore, indicating a right or left turn. The semaphore consists of oblong metal boxes enameled the same color as the car and mounted on the vertical axis. Current is taken from the storage battery.—Patrick J. Foy, Chicago.

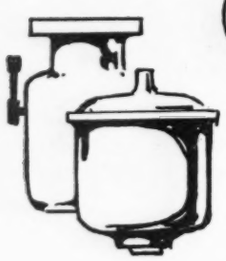
Smith

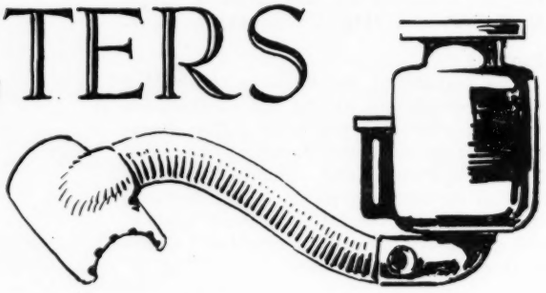
The Smith signal consists of a box-like device attached to the rear of the car or truck in such a way that it is visible from either direction. It is operated from a switch on the steering wheel. The standard color is black, though options on finish are given. Control is from a plainly marked switch on, or accessible too, the steering wheel. Price, $17.50.—Smith Signal Corp., New York.



Reading from left to right, are Answer, Reflex terminals, Champion, Tungsten and AC Carbon-Proof

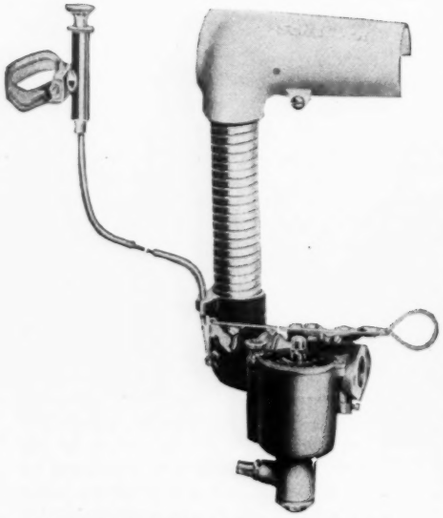
CARBURETERS



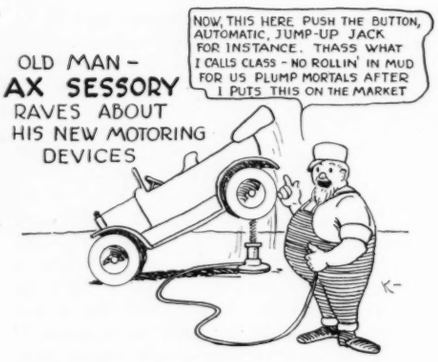


IN reviewing the intrinsic progress for the last season in the design of carbureters and other devices for making the carburetion of heavier fuels more complete and economical, it is noted that the fundamental principle involved in the carbureter is altered but little, changes being chiefly refinements; yet it retains its acceleration, starting and economical characteristics. In the last year efforts seem to have been concentrated on the development of preheating devices for handling gasoline and heavier fuels. These devices consist of special manifolds, designed to utilize the heat of the exhaust or that of the outlet cooling water. Thus it would appear that the economics of fuel consumption are receiving more attention than ever before. Of course, the fuel situation has furnished the incentive for this trend in the industry.

This can be attributed to the fact that it is practically impossible for carbureters to handle the present day fuel and secure the best results from it without the addition of heat. In order to facilitate starting a cold engine, some method of providing temporarily an over-rich mixture must be incorporated in the design and this is accomplished in a number of different manners varying from a specially constructed fuel well to a small retaining cup around the fuel nozzle proper. When the throttle is thrown open the quantity of fuel stored in these reservoirs is added to the normal mixture thus producing the desired result, an exceedingly rich mixture for acceleration or for starting. Closing the primary air opening is also a favorite method for



Wheeler-Schebler plain-tube carbureter


OLD MAN - AX SESSORY RAVES ABOUT HIS NEW MOTORING DEVICES
NOW, THIS HERE PUSH THE BUTTON, AUTOMATIC, JUMP-UP JACK FOR INSTANCE. THASS WHAT I CALLS CLASS - NO ROLLIN' IN MUD FOR US PLUMP MORTALS AFTER I PUTS THIS ON THE MARKET

aiding starting. This has the double effect of increasing suction and decreasing air.

It is not the gravity of the fuel which influences starting but the high initial boiling point, and one of the prime requisites for easy starting is that the fuel shall have not less than 20 per cent of its volume gasify at 212 deg. Fahr. If the fuel has this characteristic, one will not experience much difficulty in starting and the reason why it is almost impossible to start on kerosene without the aid of heat from an outside source is due to the fact that only about 17 per cent of its volume will gasify at 212 deg. Fahr. This offers an explanation why the kerosene carbureters are usually dual instruments. They cannot start on kerosene unless the engine is abnormally warm; thus they must resort to gasoline in order to warm the engine up before changing over to the heavier type of fuel.

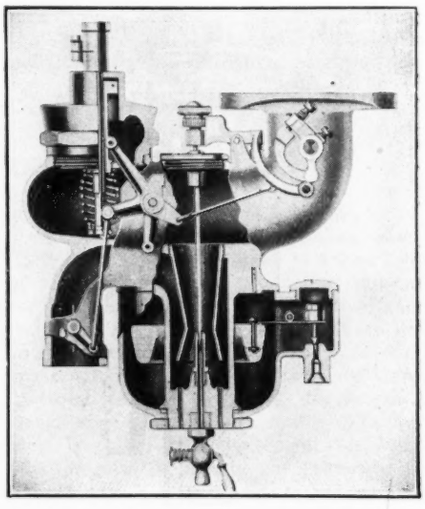
Among the carbureter types, the plain-tube is in evidence more than ever. The Schebler in adopting the plain-tube type also makes use of the Pitot principle in order to provide a rich mixture for acceleration which returns to an economical ratio after normal engine speed has been reached. Rayfield, Stromberg and Zenith continue practically the same as last year except for a few refinements tending toward greater economy. Stromberg recently announced a new carbureter adaptable to the Dodge Brothers car .

Schebler

The new series Schebler carbureters are of the plain-tube type without moving parts. The Pitot principle is employed to furnish a rich mixture for acceleration and then to thin out this mixture after a normal engine speed has been reached. There are two gasoline adjustments, one for low speed and one for high speed, which has been found advisable on account of the variations in fuels and engines. These adjustments are sufficient to provide suitable mixture for an engine over a wide range of engine speeds. One model is produced especially for the Ford car and other models of both the horizontal and vertical type are manufactured for other makes of cars. The Wheeler-Schebler Carbureter Co., Inc., Indianapolis, Ind.

Stromberg

All Stromberg carbureters are of plain-tube design, being manufactured in both horizontal and vertical types. The fuel after leaving the float chamber passes through a regulating orfice into a gasoline channel, where it is broken up by means of air being taken into this channel. This mixture then passes around an opening concentric with the throat of the venturi and is discharged from a number of small jets into the air stream at the throat of the venturi. In the construction of the carbureter there is a small reserve chamber which fills with gasoline when the engine is idling or slowing down and, upon accelerating, this reserve supply of fuel joins the flow from the main supply and thus doubles the normal amount of fuel supply in order to produce a very rich mixture for acceleration. The atomization of the low-speed supply is aided directly by dilution of air which is controlled by the low-speed adjustment. Thus, by means of two fuel paths it is natural that the fuel will follow the one having the greatest suction, and by this the highest degree of atomization is attained. The carbureter is manufactured in five models designated as LB, NB, L, M and Ford. The model L has a new economizer action, whereas the others all operate on practically the same



Van Briggle gasoline carbureter

principle. Stromberg Motor Devices Co., Chicago.

Rayfield

The Rayfield carbureter is produced in two types, model G and L, being identical except that the latter has no waterjacket. The metering pin in the main jet is operated in conjunction with the throttle, and the auxiliary nozzle is opened as the demand of the engine increases by changing the position of the auxiliary air valve. In order to prevent the auxiliary air valve from fluttering, there is a dashpot at the lower end of the air-valve stem. The piston in this dashpot also serves the purpose of pumping fuel into the auxiliary nozzle when the air valve is suddenly thrown open by the rapid opening of the throttle, thus producing an exceedingly rich mixture for acceleration. At all normal speeds the gasoline is withdrawn through the nozzle by the suction of the engine. Thus the combination of the two metering pins and the auxiliary air valve proportion the gasoline and air for a proper mixture at the various engine speeds, and an over-rich mixture can be obtained by means of the dashpot pumping action for rapid acceleration. Findeisen & Kropf Mfg. Co., Chicago.

Zenith

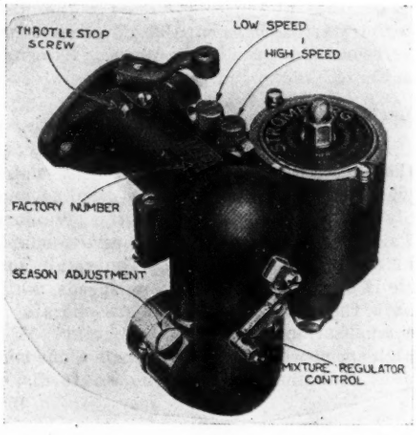
The Zenith is a compensating-nozzle type of carbureter which maintains the ratio of air to gasoline constant throughout the entire speed range of the engine. The compensating jet consists of two concentric jets, the outer one of which is in communication with an acceleration well. The inner jet is in direct communication with the float chamber. The acceleration or fuel well to which the outer jet is connected is open to atmospheric air pressure. Thus, the mixture from the outer jet becomes leaner as the engine speed increases, while the mixture from the inner jet becomes richer and through the proportion of mixtures that is supplied by these two jets there results a mixture of constant proportions. To aid in starting a cold engine, an auxiliary priming tube is supplied through which an excess amount of fuel is drawn by means of the high vacuum at closed throttle. Zenith Carbureter Co., Detroit.

Newcomb

The Newcomb carbureter is of the metering-pin type with a main nozzle and an auxiliary nozzle which leads to a point opposite the throttle to assist in starting. The incoming air lifts the pulverizing plunger, allowing a certain amount of fuel to escape, which passes through several small holes at the bottom of the plunger and mixes with the air. The plunger forms a dashpot at its upper end, which retards the lifting speed of the plunger when the engine is accelerated, producing a rich mixture for this purpose. The mixture returns to normal when the plunger ceases to rise. The amount of fuel supplied is controlled by the depression in the carbureter which can be varied by means of an adjustment. Holtzer-Cabot Co., Boston, Mass.

Ball & Ball

The Ball & Ball carbureter is a two-stage instrument consisting of a primary and a secondary passage, the former handling the demands of the engine under ordinary conditions and the latter at the other speeds in the range of the engine. To facilitate starting a choke valve is located in the primary passage which uses heated air only while the secondary passage permits cold air to pass into the mixture. In order to enrich the mixture momentarily for acceleration, a pin which is held up by the manifold vacuum is released by the breaking of the vacuum when the throttle is thrown open, thus displacing the gasoline in the pin chamber and forcing the fuel out into the mixing chamber. This, of course, slightly enriches the normal mixture. For all ordinary running the fuel is supplied from a jet located in the throat of a venturi tube and supplied with a predetermined amount of air from a fixed air opening. In connection with this there is an auxiliary air valve controlled by a spring which supplies preheated air to the mixing chamber in addition to that of the fixed air opening. When the throttle is thrown open the secondary jet discharges fuel into the fixed air passage to supplement the supply from the primary jet when the demands of the engine exceed the capacity of the latter. Penberthy Injector Co., Detroit.



Stromberg carbureter for Dodge Brothers cars

Branford

The weighted air valve is the only moving part in the Branford carbureter, which automatically regulates the amount of fuel and air supplied to the engine. This device also insures that the fuel is discharged into the moving stream of air when it is at its highest velocity, thus insuring the best atomization possible. The fuel enters through the center of the weighted valve, whose lift is controlled by the vacuum in the mixing chamber and is discharged into the air stream at the throat of the venturi. Adjustment is possible from the driver's seat from where the seating of the valve can be controlled, affording a wide range of adjustment. Holt-Welles Co., Inc., New York.

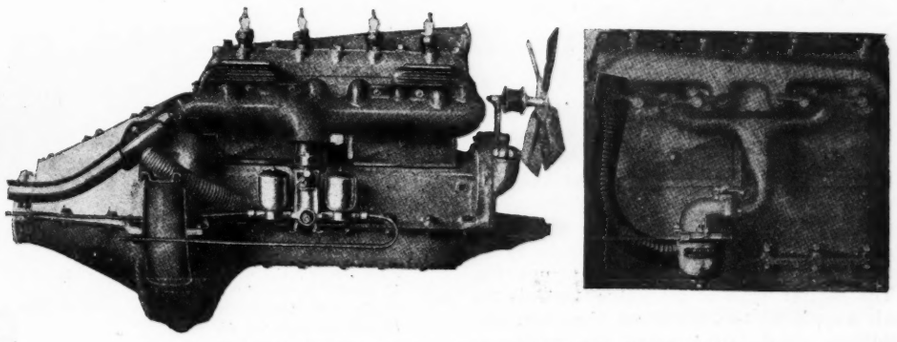
Carter

In the Carter the varying suction of the engine at the different speeds controls the amount of gasoline supplied. The fuel is injected into the mixing chamber by a series of small jets, the number of jets in operation being regulated by the level of the gasoline supply which varies with the vacuum in the mixing chamber. The multiplicity of jets is secured by drilling a series of small holes in a vertical tube, the opening at the lower portion of it, giving the low-speed supply; those in the center of the tube, the intermediate supply; and those at the upper end, the high-speed supply. The varying height of the fuel in this tube supplies gasoline for the different demands of the powerplant. Adjustment for the low speed is obtained by varying the amount of fuel admitted at the lower part of the jet tube. The 1-in. model C sells for $22.50 and model F for Fords lists at $17. Carter Carbureter Co., St. Louis, Mo.

Ensign

The mixing chamber in the Ensign carbureter is of a peculiar design, the air being drawn into it by the engine suction and set into a whirling current, by which the fuel is drawn from the overhead fuel supply due to the suction created and is then broken up in the moving air stream by being thrown into the revolving mixture. The amount of gasoline supplied to the free air depends upon the suction and after mixing the mixture leaves the mixing chamber from the bottom, passing into the manifold to the engine. The 1-in. instru-

One of the two Rayfield carbureters



H & N kerosene carbureter, left, and Branford gasoline carbureter

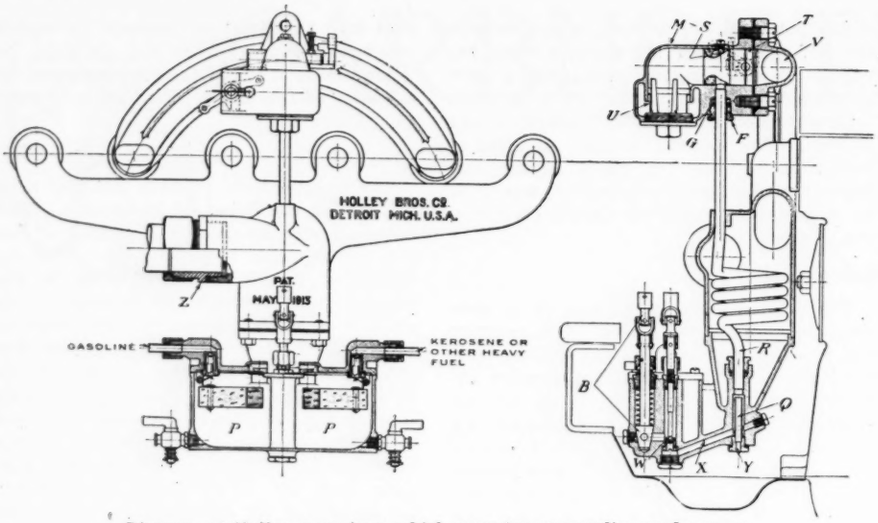


Diagram of Holley vaporizer, which operates on gasoline or kerosene

ment sells for $15 and then up to $40 for the 2-in. size. Ensign Carbureter Co., Los Angeles, Cal.

Fletcher

The main jet in the Fletcher is located in the venturi where the primary air picks up its supply of fuel. The main jet takes care of all ordinary operating conditions but to supplement it for extreme throttle openings an auxiliary nozzle is provided. The venturi tube is carried higher than the auxiliary nozzle, which permits of good idling. For acceleration the compensating jet supplies gasoline at first and then dilutes the mixture with air which afterward assumes a normal ratio. By these means the mixture has a practically constant proportion. L. V. Fletcher & Co., New York.

Marvel

The Marvel is a double-jet type of instrument with a spring-controlled air valve. This carbureter makes use of the heat of the exhaust to aid in vaporization of the fuel, which passes around the low-speed nozzle until the demand increases, opening up the auxiliary air valve to admit more air, and at the same time more fuel is supplied from the high-speed nozzle to maintain a suitable mixture for higher speeds. The carbureter is also jacketed to aid in supplying heat for handling the heavier fuel. The carbureters for commercial vehicles are so constructed that it is impossible to throw them completely out of adjustment and yet the range of adjustment is sufficient to allow an experienced mechanic to make the proper adjustment. Marvel Carbureter Co., Flint, Mich.

Juhasz

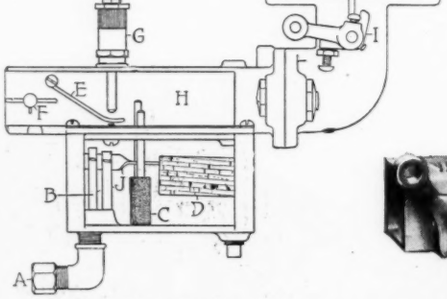
The Juhasz carbureter has three separate mixing chambers, each having an adjustable fuel nozzle. The throttle is of the cylindrical rotating type which when opened uncovers the three chambers in succession. Thus as the demands of the engine increase the number of jets in operation increase due to the throttle opening. The suction type of air valve controls the air supply to the low-speed chamber, permitting good idling when the engine is throttled. The prices vary from $25 for the 1-in. to $50 for the 2¼ in. Juhasz Carbureter Co., New York.

Kingston

The gasoline supply in the Kingston is regulated by a needle valve and the air supply by a weighted air valve except for very low speed conditions which is taken care of by a low speed tube. When the engine is running slowly the weighted air valve rests on its seat until the throttle is opened and then the air valve lifts from its seat due to the increasing supply necessary for the engine. The greater the engine speed the greater the air valve lift. A number of different models are manufactured to suit the different types of engines and among these is the dual carbureter which is capable of using either kerosene or gasoline. Byrne, Kingston & Co., Kokomo, Ind.

Lacharnay

In the Lacharnay double-jet carbureter, the throttle is of the rotary type, which when reversed shuts off the gasoline supply and admits fresh air to the cylinders. This acts as a brake and in addition aids in cooling the cylinders. The small nozzle is used for idling and low speeds, while both the small and large jets operate in compensation for normal driving. For high-speed work the large nozzle alone supplies fuel and the small nozzle furnishes air. Additional air is supplied automatically as needed by air intakes. The delivery of the two jets are proportional to each other, thus affording a constant mixture. Lacharnay Carbureter Works, Paterson, N. J.



Sunderman gasoline carbureter, A fuel inlet; B, float valve; C, fuel nozzle; D, float; E, air damper; F, choker; G, damper control; H, air passage; I, throttle; and J, float lever

Master

The Master is a multiple-jet carbureter which has a series of small jets in a block set so that when the throttle of the rotary type is opened the number of jets opened increase as the throttle opening increases. This is really a mechanical method of breaking up the fuel by the use of a series of fine jets. The air supply can be controlled by the car operator by means of a moving gate in the jet chamber which serves to make the mixture either lean or rich. Master Carbureter Corp., Detroit.

Stewart

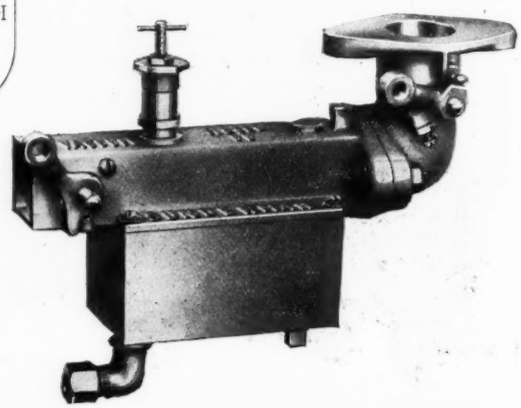
The gasoline supply in the Stewart carbureter is controlled by a metering pin which obtains the fuel from a dashpot located at the bottom of the metering pin. When the engine is started the vacuum created in the mixing chamber raises the valve and permits gasoline to be supplied along with the air supply. The greater the amount of gas needed by the engine the greater will be the lift of the valve and the fuel and air are always in proportion to the lift of the valve. Thus the ratio of air to gasoline is held constant resulting in a proper mixture. Detroit Lubricator Co., Detroit.

Shakespeare

The feature of the Shakespeare carbureter is the automatic valve which proportions the fuel and air for a proper mixture through the entire range of the engine. In connection with this an auxiliary air valve is provided to supply air to the mixture at high engine speeds. Only one adjustment is provided, that being to regulate the amount of gasoline. A manually-operated primer is furnished with the instrument for starting, which supplies an over-rich mixture for this purpose. Shakespeare Co., Kalamazoo, Mich.

Tillotson

The chief feature of the Tillotson carbureter is that it uses a variable air valve in the form of reeds, placed in such a position as to form in principle a variable venturi. As the demand by the engine increases, the reeds open to permit passage of more air, and the fuel is mixed with the air at the nozzle, at which point the velocity



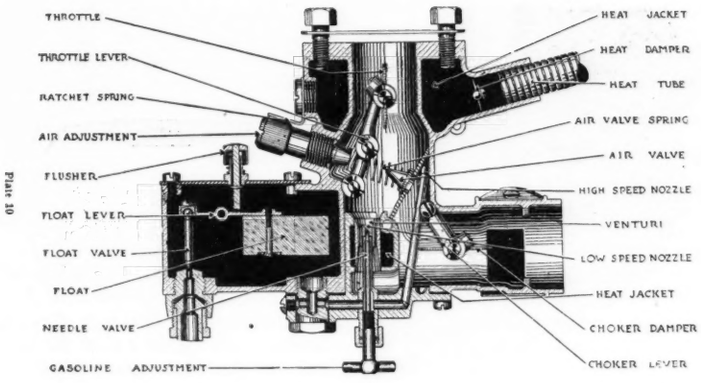


Plate 10

Marvel double-jet type of carbureter with spring-controlled air valve

of the air stream is greatest. Tillotson Carbureter Co., Toledo, Ohio.

VanBriggle

The principle of operation of the VanBriggle carbureter is that the primary air enters the venturi tube with a twirling movement, breaking up the gasoline into minute particles. The mixture thus formed then travels up the venturi tube and is discharged into a mixing chamber, where the auxiliary air from the auxiliary air opening mixes with the primary mixture and produces a second mixture. The principle is employed in all the various types. In order to facilitate starting a choke is supplied which completely closes the primary and the auxiliary air passages, and at the same time lifts the gasoline level in order to produce an overrich mixture. The Ford special carbureter sells for $16.50, and the other standard sizes vary in price from $22.50 to $27.50. VanBriggle Motor Devices Co., Indianapolis, Ind.

Air Friction

The Air Friction carbureters are of the auxiliary air valve type together with an adjustable needle at the spray nozzle. Holes are drilled in the lower collar of the nozzle, which gives complete economy starting and idling. The carbureter is of such design that it is possible to use low-grade fuels with excellent results. It is also possible with this instrument to use a mixture of half kerosene and half gasoline. The air supply can be controlled from the dash. Air Friction Carbureter Co., Dayton, O.

Breeze

In principle, the Breeze carbureter is a simple air-valve type and is described by the makers as being an automatic aspirating type. The fuel nozzle is located in the throat of the venturi through which the incoming air passes and is mixed with the fuel discharged from the nozzle. The suction in this case determines the amount of fuel withdrawn from the nozzle. In order to prevent the mixture becoming overrich at high speeds an auxiliary air valve is provided to supply additional air. Breeze Carbureter Co., Newark, N. J.

Zephyr

The Zephyr is a plain-tube design with a ball valve at the air intake. Preheated air is taken in through the primary opening, which is situated above the main opening, which is the ball valve. The atomizer and jet run from the float bowl into this air passage at right angles, and the velocity of air over the exterior end of the atomizer creates sufficient vacuum to spray the fuel into the venturi mixing chamber. The atomizer has four different jet openings, the adjustment of which is made by turning it until the proper opening is in line. A throttle jet facilitates starting and also serves the engine for idling. A choke is provided in the bottom of the air tube which when closed throws all of the suction on the atomizer and provides a rich mixture for starting purposes. Federal Brass Works, Detroit.

Webber

The Webber is a metering-pin type of carbureter. The nozzle is located in the venturi and the size of the fuel orifice depends upon the lift of the pin which is interconnected with the auxiliary air valve. At low engine speeds the gasoline orifice is smallest, due to the fact that the auxiliary air valve is closed. However, when the throttle is open the auxiliary air valve lifts the metering pin and increases the gasoline supply in proportion to the flow of air. The primary mixture after its exit from the main venturi passes through a series of smaller venturi tubes arranged in a circle around the large venturi, which tends to break up the fuel and produce a well-atomized mixture. Webber Mfg. Co., Boston, Mass.

Tom Thumb

The Tom Thumb carbureter is of the metering-valve type in which the throttle is interconnected with the needle valve. Thus when the throttle is open the fuel port also opens, providing a greater supply of gasoline. The fuel is fed into the air stream by means of six small holes in the fuel distributor. It is possible to adjust the fuel flow by means of a needle valve. National Equipment Co., Chicago.

Miller

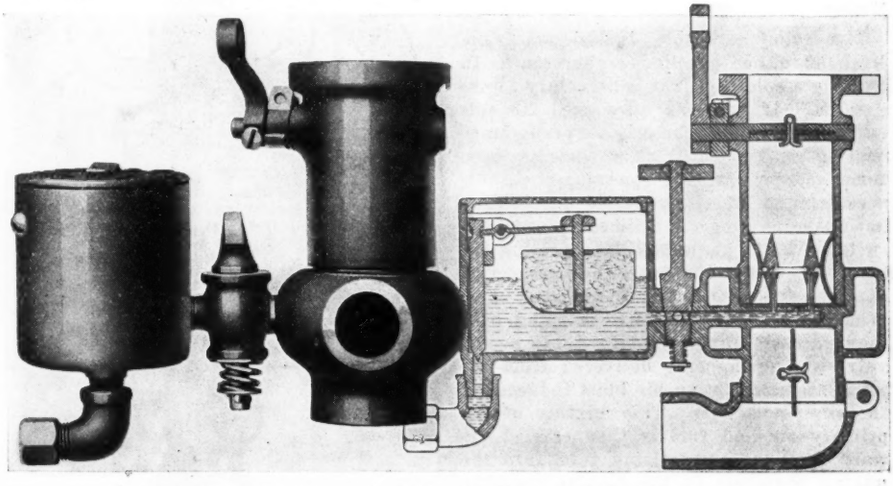
The Miller is a non-adjustable carbureter of the multiple-jet type. When the throttle is closed the fuel jets are covered by a sleeve, and as the throttle is opened the vacuum due to the engine causes the sleeve to rise, uncovering one by one the fuel jets. These jets are placed at graduated heights such that the fuel supply will always be in proper proportion to the flow of air. All the jets and air spaces are uncovered with wide-open throttle. To prevent the possibility of the suction sleeve fluttering and varying the mixture, its action is dampened by means of a plunger weight which fits into a small cylinder filled with gasoline from the well. Free air is permitted to enter at the opening between the jet posts. Due to the construction of the jet and air opening, the air on all sides must pass close to a jet which makes possible even distribution of the fuel in the air stream as a suction draws air from gasoline equally from all points. Miller Sales Corp., Los Angeles, Cal.

K-D

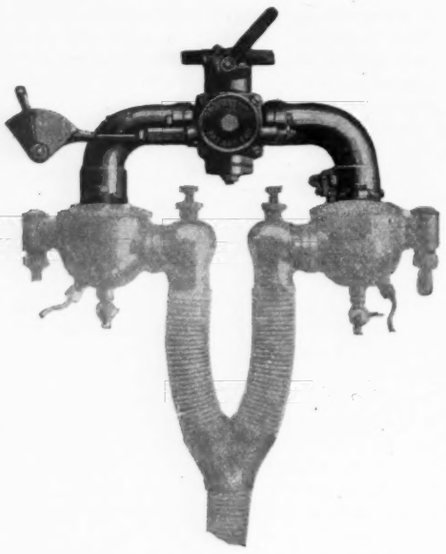
The K-D is an extremely simple instrument, there being but one adjustment on the entire carbureter. The incoming air enters through a ball valve which proportions the air in proper ratio to the engine speed. The air then passes through a venturi in which is located the single fuel nozzle, and the fuel is discharged from it in the throat of the venturi tube, at which place the velocity of the air stream is greatest. Thus, by means of the ball valve the air and gasoline are properly proportioned in order to produce a suitable mixture for the engine. K-D Carbureter Co., Cleveland, O.

Sunderman BB

The new model Sunderman carbureter is similar in principle to the other Sunderman types, the chief change being that the tank now is located underneath instead of at the side of the carbureter. The new



Detroit kerosene carbureter, which embodies a specially formed venturi



Rhamstine kerosene adapter for Schebler

construction is designed to give a longer sucking distance with consequent better vaporization, and as it gives greater depth there is less chance of the well being sucked dry momentarily when the car is being tipped while rounding a curve or climbing hills. Sunderman Corp., Newburgh, N. Y.

Johnson

The Johnson carbureter is a gravity iar-valve type with a single concentric jet. The idling has been improved by moving the idling passage into the strangle tube where the vacuum is higher. This makes the idling adjustment independent of the high-speed adjustment, which is controlled by the needle valve at the bottom of the carbureter. The air valve consists of a single sleeve which rises and falls with the variation of the engine vacuum and is located in the cylindrical passage above the jet. The model for V engines is fitted with a throttle pump giving an excess supply of fuel for quick acceleration. Complete equipment is sold with the instrument including a stove, a hot-air tube and dash control, for several standard models. Johnson Co., Detroit.

Kerosene Outfits

Holley

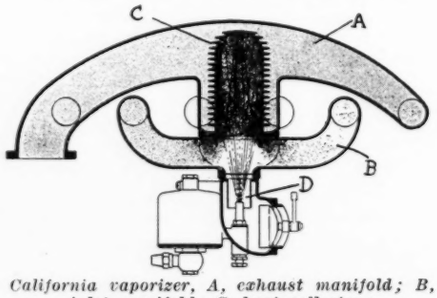
The Holley carbureter is designed to operate on either gasoline or kerosene. In starting a cold engine it is necessary to use gasoline. If kerosene were used for this purpose it would necessitate preliminary heating of the vaporizing elements from some outside source, consequently it is necessary to start the engine on gasoline until same is properly warmed up and then switch over to kerosene. In operation the kerosene and gasoline enter their respective float chambers through ordinary float valve mechanism. The fuel that is being used then passes through an adjustable needle valve and upon being delivered from the jet is atomized by an air blast induced by the engine vacuum. This mixture of the primary air and fuel is then carried upward through a vaporizing tube into the mixing chambers in the special manifold and in this chamber is mixed with the main

Goodrich thermostatic carbureter control for starting cold engines

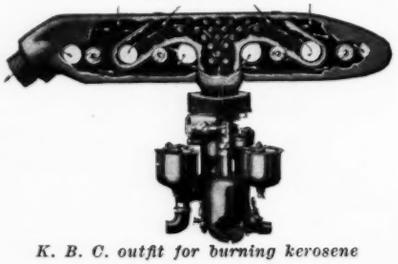
air supply, which enters through a valve, the opening of which is controlled by the engine vacuum. From this mixing chamber the mixture then is conducted to the engine cylinders by means of the customary manifold. The price of the completed outfit for the Ford car is $28. Holley Kerosene Carbureter Co., Detroit.

Detroit

In order to burn a heavy fuel such as kerosene it is necessary to atomize the fuel into as fine a spray or fog as possible. This is accomplished in the Detroit carbureter by means of a specially formed venturi. It is also necessary to raise the temperature of the fuel as high as possible without vaporization, which is obtained by a preheating jacket which surrounds the kerosene fuel inlet and jets. This preheater utilizes the the heat of the exhaust. Two venturi and two jets are used, one for low speed and one for high speed, which makes it possible to have a very high velocity through the venturi at all engine speeds. Thus there is a high velocity through the low-speed venturi, at low engine speeds, which aids in atomizing the fuel. The high-speed venturi is in use only above medium engine speeds, which makes possible a high velocity from the venturi. On account of the difficulties in connection with starting with kerosene, gasoline is used for this purpose, and the engine is allowed to run for a few minutes in order to warm up properly before it is switched over to kerosene. This carbureter has only one float chamber, but by the use of a three-way valve, gasoline is admitted for starting. On account of proper temperature being used in preheating the kerosene gas, the company states that there



California vaporizer, A, exhaust manifold; B, inlet manifold; C, heat collector; D, fuel nozzle



K. B. C. outfit for burning kerosene

is no more precipitation of carbon in the engine than there would be with gasoline. Detroit Kerosene Carbureter Co., Detroit.

Kingston

The Kingston carbureter is of dual construction, such that one side is adapted for the use of kerosene or distillate and the other for gasoline. In operation the engine first is started on gasoline and then allowed to warm up sufficiently to permit the use of kerosene, at which time it can be switched from gasoline to kerosene by means of a three-way valve. Fuel is drawn into the carbureter by means of the customary float valve mechanism, and from there to a spray nozzle located in a venturi. Due to the construction of the spray nozzle there is a small cup rounding it which holds an excess of fuel in order to furnish a rich mixture for starting purposes. At high engine speeds this cup becomes empty and the fuel is drawn direct from the adjustable needle valve. Both the constant and auxiliary air are withdrawn from a common source, the auxiliary air being admitted through a series of ball valves which lift automatically in order to proportion the air to the variation in engine speed. Thus by the combination of this series of auxiliary valves the ratio of gasoline to air is maintained. Byrne, Kingston & Co., Kokomo, Ind.

K. B. C.

The K. B. C. outfit for burning kerosene consists of a double-bowl carbureter and a hot-pin intake manifold. The intake manifold is cast integral with the exhaust manifold and is surrounded by the latter. The interior of the intake manifold is studded with cast iron pins, which carry the heat into the interior of the intake manifold, and thus give up heat to the gases passing through the manifold. It always is necessary when starting a cold engine to use gasoline and then after the engine is thoroughly warmed up, switch over to kerosene by means of a fuel control valve. The fuel and air are atomized in the carbureter in the form of a primary mixture and then pass up into the hot-pin manifold, where the mixture absorbs heat from the hot pins, which derive their heat from the exhaust gases. The complete equipment, including manifold and carbureter, sells for $40 for Ford cars. Kerosene Burning Carbureter Co., Detroit.

Kero-Karburetor

The Kero-Karburetor itself is of dual construction, having separate float chambers for gasoline and kerosene. In operation the fuel is withdrawn from a fuel nozzle by the suction of the engine, and this fuel is discharged into the air screen at the throat of the venturi tube, at which point the velocity of the air is greatest.

The primary mixture leaves the carbureter as a fine vapor and passes into the special manifold, where heat is absorbed from the exhaust gases of the engine. The instrument is provided with two low-speed adjustments, one for kerosene and one for gasoline. The price of the complete outfit is $35. Western Carbureter Co., Inc., Chicago.

H & N

The movement of the fuel measuring device in the H & N carbureter is controlled by the auxiliary air through an air dash pot. The nozzle is located in the venturi through which the primary air passes, fuel being discharged into the air stream at this point. At high engine speed the opening of the auxiliary air valve lifts a metering pin and provides a proper amount of gasoline for the air supply. The duplex carbureter operates on the same principle, but has an additional float chamber for handling kerosene. In this kerosene type the heat of the exhaust is utilized to heat the venturi, which is surrounded by heating unit. The engine is first started by means of gasoline and after being thoroughly warmed up is switched over to kerosene by means of a simple slide valve. H & N Carbureter Co., New York.

Bennett

The type C Bennett carbureter is one designed for use with kerosene, the fuel being vaporized by the use of the exhaust heat, which is permitted to pass around the mixing chamber whose exterior surface is constructed with fins so that the maximum of heat may be collected from the exhaust. The carbureter has two adjustments, one for low speed and one for high speed. The slow-speed adjustment regulates the lift of the low-speed nozzle, and the high-speed controls the main fuel nozzle. This device will give excellent results with gasoline, and if the fuel is not too low in grade it will not be necessary to use the heating device. The model K is a carbureter designed for use with gasoline and operates on the same principle as the model C. The 1-in. type C sells for $35 and the type K for $10.—Wilcox-Bennett Carbureter Co., Minneapolis, Minn.

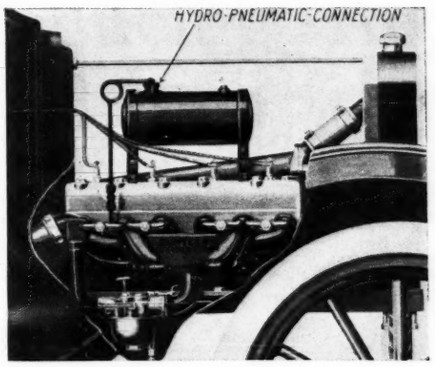
Sundries

Goodrich Thermostatic Carbureter Control

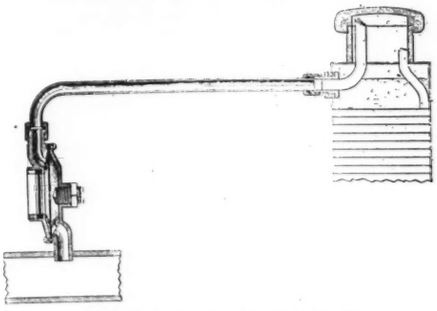
The Goodrich control automatically adjusts the carbureter for variable temperature conditions. When starting a cold engine the device permits a greater supply of fuel to be used in order to produce an overrich mixture for starting purposes, and as the engine warms up it automatically reduces the flow of fuel until a normal running mixture is reached. This device is made so that it can be attached to standard Ford carbureters and sells complete for $5. Goodrich-Lenhart Mfg. Co., Philadelphia, Pa.

Wilmo Manifold

The Wilmo manifold is an integral casting combining both the exhaust and intake manifolds. The object in casting the manifold in this manner is so that the heat of the exhaust can be utilized to superheat the fuel mixture. It is claimed by the manufacturer that this device will make a remarkable increase in fuel mileage when adapted to a motor car. The stock attachment for the Ford car sells for $7.50, and for other cars the prices range up to $15. Whittier Co., Chicago.



Duntley gas generator for heavy fuel



Hydro-Eye device for moist air

California Fuel Vaporizer

In the California fuel vaporizer the heat of the exhaust is utilized to evaporate the fuel. The fuel and air pass through the carbureter in the ordinary manner and are mixed in the proper proportions, after which the mixture passes through the heated structure, absorbing heat from it. The contrary direction of flow of the fuel particles and vapor is said to give high vaporizing capacity of the unit area of the inner chamber wall through the transfer of heat to the incoming fuel.—California Vaporizer Co., Los Angeles, Cal.

Willard Superheater

The Willard superheater is a device to be used in connection with the standard manifold on the Ford. The cast-iron superheater fits over the exhaust manifold and is held in position by two straps. The air, which is superheated underneath the stove, then is conducted by means of a flexible aluminum tube through the air intake to the carbureter. The superheater sells for $5. The Willard Co., South Bend, Ind.

Rhamstine Kerosene Adapter

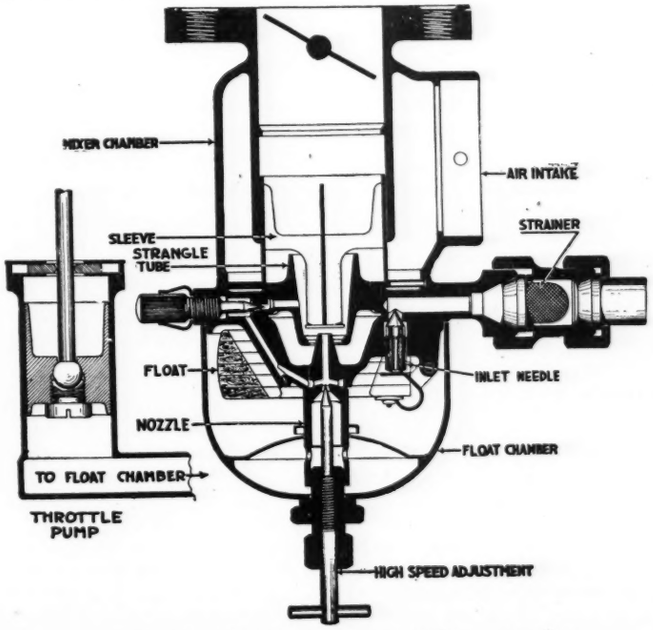
The Rhamstine kerosene adapter is used in connection with two Schebler carbureters, one of these being used for gasoline and the other for kerosene. The gasoline carbureter is used for starting purposes only. The two carbureters are controlled by a valve which permits changing from one fuel to the other. The raw fuel is heated to 135 deg. Fahr. before it enters the carbureters, and the air is likewise heated to 175 deg. Fahr. From the carbureter the mixture passes into the adapter, where it is dried and broken up.—Rhamstine Kerosene Adapter Corp., Washington, D. C.

Duntley Generator

The Duntley gas generator is a hydro-pneumatic device to handle low-grade fuel. Its function is to prevent raw fuel from entering the engine and to form a gas mixture which, it is claimed, will make for a saving of more than 50 per cent, using a mixture of half kerosene and half gasoline. The resulting mixture is called hydro-pneumatic gas. No machine work is required for installation, which takes 30 min. Chicago Pneumatic Tool Co., Chicago.

The Hydro-Eye

The Hydro-Eye is a carbureter accessory which is attached to the manifold and the other end is connected to the upper part of the radiator. From the radiator the device draws in moist air and delivers it



Explanatory drawing of Johnson gasoline carbureter

into the manifold of the engine. The water vapor upon arriving in the entrance cylinders is changed into steam which tends to give more complete combustion and thus reduce the possibilities of carbon deposits. Hydro-Eye Co., New York.

CMC Device

The CMC Device is a carbureter accessory designed to be substituted in place of the gasket between the carbureter and the manifold. Free air is taken in through an adjustable ball valve and is delivered into the manifold in the manner such that its action creates a whirling motion, tending to more completely break up the mixture.—Carbureter Mantle Co., Inc., New York.

Smith's Duplex Primer and Decarbonizer

The Smith duplex primer and decarbonizer utilizes the compression of the engine to force through the device and into the intake manifold a constant spray of gasoline and air and thus provide a rich mixture which will start readily any engine. The device has no moving parts and is very simple in its operation. The decarbonizing part of the device consists of a tube through which water can be fed into the engine, where it is changed into steam and thus aiding the removal of the carbon. Price, $10.—Fred Smith, Stamford, Conn.

Car Specialties

Johnson's Products

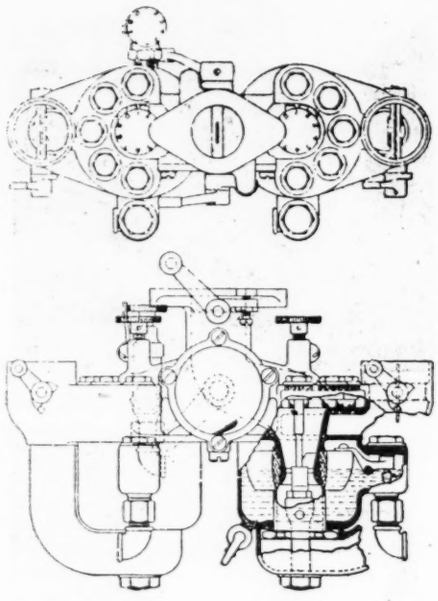
Foremost among the Johnson products are the cleaner and prepared wax, which is adaptable to cleaning and polishing of bodies, fenders, and bonnets. The cleaner will remove spots, tar, alkali and road oil without injuring the finished varnish on the body. The prepared wax is intended to be used as a finish polish. The other Johnson products include a stop squeak oil specially prepared for spring lubrication, Johnson Black-Lax, a dressing for mohair and leather tops, a carbon remover and a non-freeze solution. A new product, Johnson's radiator cement, has just been announced and is a cement by which the rapid repair of radiators is possible.—S. C. Johnson & Son, Racine, Wis.

Auto Liquid Veneer

Auto Liquid Veneer is a preparation for cleaning and polishing varnished surfaces. It is said not to collect dust or leave a greasy film. The spray treatment removes dust, mud spots and road tar without scratching in from ten to twenty minutes. The preparation is conveniently put up in bottles and the outfit consists, beside the liquid, of a pump for application. Price, $1.50.—Buffalo Specialty Co., Buffalo, N. Y.

Radiator Neverleak

Radiator Neverleak is for mending leaky radiators. It is simple in its application and prevents future leaks without interfering with any anti-freezing compounds that may have been added to the water. It is said to contain no meal, cement, acid or sediment to clog or impair the cooling system. It also tends to prevent rusting and the formation of scale. It is put up in tin cans and there are two sizes. Prices, 50 cents and 75 cents.—Buffalo Specialty Co., Buffalo, N. Y.



Kingston dual-type kerosene carbureter

X Radiator Liquid

X Radiator Liquid is poured into the radiator and circulates freely as part of the water. Eventually it turns to a metallic solid over every leak whether in the radiator, water jacket, hose coupling, engine head, or elsewhere in the cooling system. It prevents the formation of scale and is said to neutralize the corrosive elements in water. Its usefulness is not impaired by any anti-freeze solution. It is put up in convenient form and the small size sells for 75 cents. Price for large can, $1.50.—X Laboratories, Boston, Mass.

Peerless Specialties

Peerless specialties comprise a number of preparations for refinishing motor car tops, cushions and bodies. There are special Peerless varnishes in an assortment of colors for refinishing jobs. Peerless tire paint is useful for rejuvenating old tires, and there is a special black japan for finishing fenders, etc. Peerless anti-freeze offers protection to the cooling system for temperatures to 15° below zero.—Columbus Varnish Co., Columbus, Ohio.

Dutch Brand Products

Dutch Brand products consist of a radiator seal compound, friction tape, puncture cement, vulcanizing cement, gasket shellac, etc. All of these products are put up in tubes or tin cans with screw top covers.—Van Cleef Brothers, Chicago.

Wonder Worker

The Wonder Worker line includes finishers for practically all parts of the car from lamps and cushions to exhaust pipes, etc. Mica tire powder, cement, valve-grinding compound, carbon remover, Never-Freeze and self-vulcanizing patches are among the other products of the line. Two sizes of fire extinguishers also are supplied, one for the tool box and one for the garage. Lack of space prohibits description of the entire line.—Gray-Heath Co., Chicago.

Brake Linings

Stanwal Brake Lining

Stanwal brake lining is suitable not only for braking surfaces but clutch facings, etc. It is a non-hardening, non-glazing brake lining and the base is woven brass, wire-covered and protected by a special fabric, treated and proof against frictional heat. Other Stanwal products consist of friction tape, splicing compounds, cable and specification tapes, moulded rubber goods, matting, and rubber tire tape.—Stanwal Woven Fabric Co., Walpole, Mass.

Non-Burn Brake Lining.

A Non-Burn brake lining consists of specially-treated asbestos fiber woben in conjunction with a metallic base. It is supplied in all widths and guaranteed against hardening or glazing. Frictional heat is said not to affect it and one application to the brake shoes will last for a long period.—H. W. Johns-Manville Co., New York.

Thermoid

Thermoid brake lining is a hydraulic compressed lining and consists of a copper wire base surrounded with specially treated asbestos. It is so constructed that the brakes have a smooth action and will not grab or slip. It has been successfully used on leading racing cars where tests for such substances are very severe. It can be had in any width to meet all sizes of brake shoes.—Thermoid Rubber Co., Trenton, N. J.

Cork Insert Linings

The cork insert lining eliminates the grabbing and slipping in the Ford planetary transmission. This is possible because the cork inserts do not become glazed nor swell from the effect of oil and grease, always retaining their characteristic surface which permits a smooth transmission action. Brake lining of practically the same type is also made for heavier cars. A cork insert fan belt also is offered.—Advance Automobile Accessories Corp., Chicago.

Raybestos Disk Clutch Facings

The Raybestos disk clutch facings were developed for use with the multiple-disk clutch. The facing consists of an interwoven metallic asbestos band which has the characteristic of retaining its original face after considerable service, and provided it does wear to any extent the friction coefficient of this surface does not change to any great extent. This fact also prevents possibilities of the clutch grabbing when starting a car from rest.—Raybestos Co., Bridgeport, Conn.

Staybestos

S-M-C asbestos brake lining is said to be very compactly woven and thoroughly treated with a special compound to prevent glazing and hardening from frictional heat. In making it large steel rollers are used which compress it to exact size. This concern also makes a special set of brake linings to be used on the transmission bands of the Ford. Staybestos Mfg. Co., Philadelphia, Pa.

Glare-Reducing Accessories

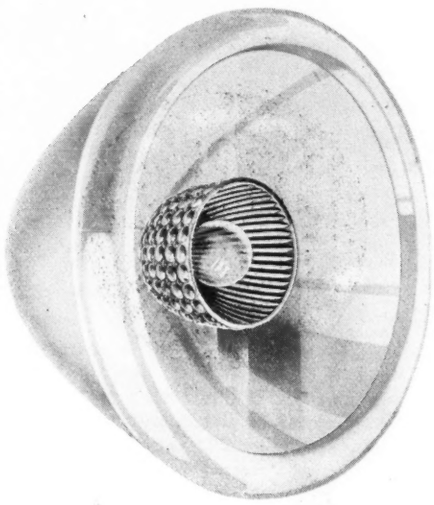
THERE are three general ways of preventing glare from motor car headlights, and practically all the anti-glare lenses now on the market make use of them, either singly or in combination. One method is to diffuse the light, and this is accomplished by constructing the surface of the lens with radial, circular or semi-spherical projections which break up the concentrated rays of light reflected from the parabolical surface of the lamp reflector through the lens. Another construction adopted by many is to deflect the light downward, accomplished variously by shaping the lens surfaces with ribs or prisms which bend the horizontal rays emerging from the lamp so the brightest spot of illumination on the road is at the most advantageous distance from the car. In this way also there are no rays which extend above the horizontal, the ones that usually blind the driver of an oncoming vehicle. The third method is to fit some sort of shield over the lamp bulb, limiting the light that is reflected by the lamp to only the useful rays. This is carried out in one make of lens, also by the use of a fin cast integral with the lens which extends inward over the lamp bulb. Provision also is made by many to illuminate the road immediately in front of the car and for quite a distance on each side. This is accomplished in some instances by casting the lens with circular ribs on the bottom half, which spread the light. Other makes of lenses have vertical serrations on the inside which bend the rays of light laterally. Following are descriptions of non-glaring lenses and their manner of operation:

Aderente

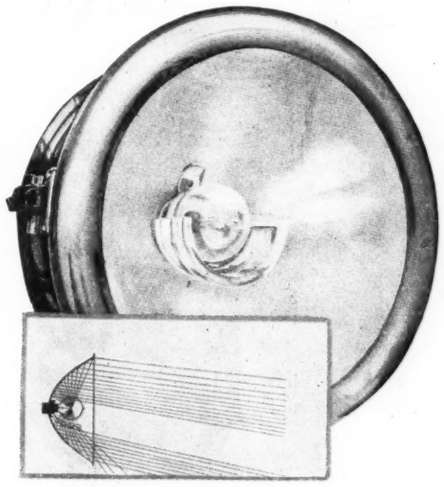
The Aderente deflector is intended to give the car owner the full benefit of all the electricity or gas he may burn in his lamps. It is not a dimmer but a deflector which is so constructed that it deflects the rays of light that rise to the tree tops and keeps them on the road. The device consists of a series of obliquely-placed reflectors in the upper half of the lens which deflect the rays coming from the parabolical surface of the lamp in parallel rays. Once it is applied to the lamps it need not be touched again as it is on the inside and fully protected by the glass. Price, $2 per set. Jay & Dee Specialty Co., New Lork.

Amco

The Amco light deflector consists of a small cup-shaped reflector that is snapped on the bottom of the light bulb and serves to deflect the light to the upper half of the silvered reflector. From here the light is projected outward and downward to the road in front of the car. The interior of the small reflector is finished in white enamel. The device is easy to install as it is only necessary to remove the door of the lamp and snap on the reflector. Price, per pair, $1. Art Metal Mfg. Co., Cleveland, Ohio.



New Stewart lens complete



Fractors—a device which bends the upward rays of light down on to the road

Controlite

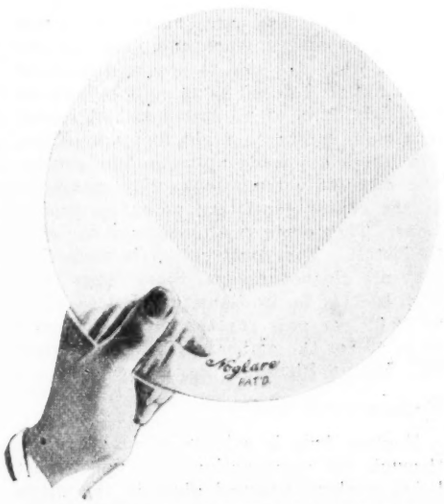
The Controlite lens is of the deflecting type. The upper portion of the beam is contracted and the light concentrated for distance. The beam projected intersects the highway 20 ft. distant from the car and 30 ft. distant the lighted area is about 40 ft. wide. As the distance increases the light rays gradually converge, thereby concentrating the total available light for distance, which is accomplished by the multifocal construction of the lens. The light beam is depressed below the 42-in. level at 75 ft. distant. The Controlite lens can be had in sizes from 8 in. in diameter to 12 in. Price, per pair, from $3.50 to $5. Super-Lighting Co., Inc., New York.

Corning Conaphore

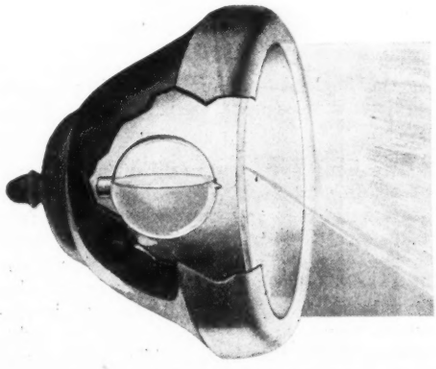
The Corning Conaphore is made with a series of horizontal corrugations on the inner face which bend down the light rays and concentrate them in a long intense beam not more than 42 in. above the road. It is made of Noviol glass, which absorbs the violet and blue rays but can also be had in clear glass. The latter are said to be equally efficient in giving long range and eliminating glare but lack the added advantage of the Noviol glass of eliminating back-glare and penetrating fog or dust. Corning Conaphore lenses fit any car and it is only necessary to remove the old glass now in the lamps and install the Conaphore. Price, per pair in Noviol glass from 3 in. to 11½ in., $1.30 to $6. In clear glass the same sizes cost from 30 cents per pair to $4. Corning Glass Works, Corning, N. Y.

Dillon

The Dillon multi-vision lens is said successfully to eliminate glare without decreasing the range of vision, giving actu-



Noglare lens, of prismed and sanded glass



Amco cup-shaped light reflector

Shaler Roadlighter lens

ally twice the lighted area afforded by lamps of the conventional type. The Dillon with its distinctive square path of light affords illumination for over 500 ft. ahead and over 25 ft. on either side. It consists of a conical-shaped deflector with lens, the construction being such that the glare producing rays from the light bulb are converted into non-glaring intense rays. It is easy to install and sells for $3.50 per set. Dillon Lens & Mfg. Co., Wheeling, W. Va.

Fractors

Instead of dimming the lights Fractors take the rays which would otherwise go upward and add them to those which go straight ahead. Not only are they said to eliminate glare, but they concentrate the light and place it where it is most needed —on the road. Fractors operate on the same principle as that used in the original lighthouse lens. They slip in back of the bulb and bend and multiply prismatically the rays of light. To install them it is necessary to remove the bulb, pass the Fractors over the lamp socket and replace the bulb. Crew-Levick Co., Philadelphia, Pa.

Holophane

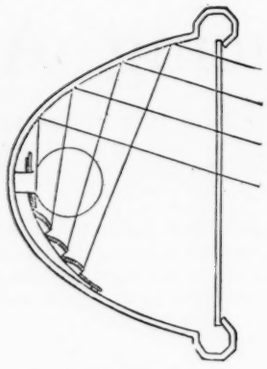
The Holophane lens by an exclusive feature, the fin, keeps the concentrated searchlight beam below the 42-in. level, lights the road far ahead and provides ample light, it is said, directly in front of and to the side of the road. The fin which is on the inside of the lens diffuses the upward rays and prevents a direct light higher than 42 in. The prisms at the top also bend the upward waste rays down below the 42-in. level out of the eyes of the approaching driver. The radial prisms in the center bend the rays sharply for lighting near the wheels and to the sides. The circular prisms at the bottom deflect the beam slightly to provide a broad clear light in the road at a distance. The Holophane comes in sizes from 7 in. in diameter to 10½ in. Price, from $2.75 to $4, per pair. Holophane Glass Co., Inc., New York.

Lancaster

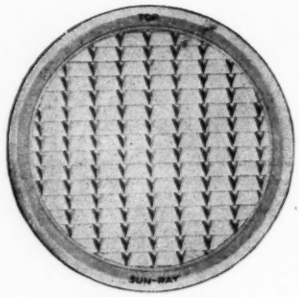
The Lancaster diffusing lens is a permanent non-glaring appliance which has the approval of the Department of Motor Vehicles of New Jersey. As may be judged from its name it lays claim to its non-glare capacity through the character of lens rather than a disk or other device. It can be equally used on gas or electric lamps and is furnished in a variety of sizes to fit different diameters. Price, per pair, from $1 to $2.50. Lancaster Lens Co., Lancaster, Ohio, Star Lens Co., Chicago, distributer.

Legalite

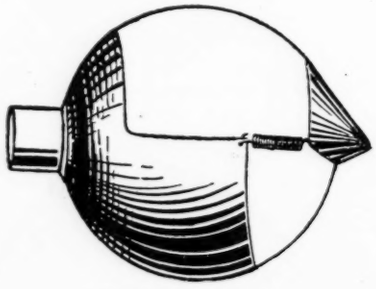
The Legalite lens is made with a series of horizontal corrugations which deflect the rays of light downward so that none of them are more than 42 in. above the ground. It will throw a searchlight 250 to 500 ft. ahead, it is stated, and complies with all headlight laws. High-candlepower bulbs are not necessary with the Legalite lens, for satisfactory results are obtained with standard lamp equipment. These lenses are made in sizes from 7¾ in. in diameter to 11⅛ in., and the price ranges from $2.75 to $4.50 per pair; west of the Rocky mountains 25 cents per pair additional. Legalite Corp., Boston, Mass.



Letts ray deflector



Sun-Ray lens



Stryker deflector bulb

Pittsburgh Parabolite

Lenslite

The Lenslite is a strictly diffusing type of headlight lens. It is said to remove all glare without in any way impairing the full value of the light. It affords more light in the distance and complies with all ordinances, it is stated. The surface of the lens is made up of semi-spherical knobs which break up the direct rays of light coming from the lamp. The sizes vary by ¼ in. from 8 in. to 11¾ in. in diameter. Prices range from 45 cents to $1.25 per pair. Manufacturer's Glass Co., Chicago.

Letts

The Letts deflector is a metal shield held in place within the headlamp by the bulb, which is screwed through a round opening at the top of the deflector. Projecting double-oval wings reflect the ray backward and outward and direct it downward without absorbing light, it is stated. It can be adjusted so that the direct ray strikes the road at any distance from the car. It comes for all sized lamps and is easy to install. Price, per pair, $1. Hill-Smith Metal Goods Co., Boston, Mass.

Macbeth

The Macbeth lens is distinguished by the visor which is enameled green on the outside and white on the inside. The primary object of the visor is to redirect any upward rays of light downward. The front surface of this lens is divided into five horizontal prisms, each of which is inclined at an angle. As a result the light is directed down below the horizontal, lighting the path of the car at the greatest possible distance without glare. At the back of the lens are concave recesses which spread the light laterally, providing essential side lighting for country driving and for turning corners. Macbeth lenses are made in all sizes to fit standard lamps. Price, per pair, $5. There is a special size for Fords for $4 per pair. Macbeth-Evans Glass Co., Pittsburgh, Pa.

McKee

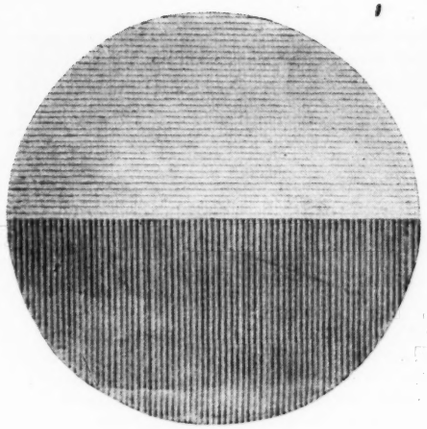
Greater reduction of glare combined with more light on the road are the claims made for the McKee standard headlight lens. This lens is built on the concave-convex principle and is said to increase the usuable light 35 per cent, while the glare is reduced 87 per cent. The McKee lens is made with a series of vertical corrugations on the upper half of the outside convex surface, while the lower portion is fitted with nine horizontal prisms. The latter not only tend to deflect the light rays downward, but the convex surface allows of considerable lighting laterally. They come in standard sizes. McKee Glass Co., Jeannette, Pa.

Morelite

Morelite lenses are made in either crystal or amber glass and come in one piece. They are said to secure a brilliant light but so diffused as to comply with all headlight laws of all states and to render maximum safety to night driving. Morelite lenses are made up with four concentric circular corrugations, with a cluster at the center consisting of radial projections. They come in all sizes and are easy to install. The construction is such that they are cleaned easily. Sizes range from 6 in. to 11¼ in. in diameter. Prices, $1.50 to $2.25 per pair for the plain glass and $2 to $3 for the amber. L. E. Smith Glass Co., Mount Pleasant, Pa.

Noglare

Noglare lens is said to eliminate glare through its construction, the upper part being a clear, prismed glass in the shape



Saferlite lens

glass. The latter acts as a dimmer on the rays thrown upward by the lower part of of a flattened U and the lower of sanded the headlight reflector, while the upper part controls and directs the light low down on the road, it is said. It has the approval of officials in San Francisco and Portland, Ore. Prices range from $3 to $4 per pair, according to size. Noglare Auto Lens Co., Portland, Ore.

Osgood Long-Distance

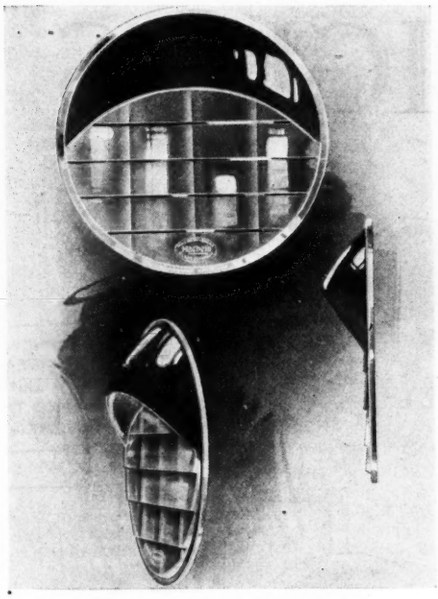
In the Osgood Long-Distance lens the surface has been divided into prisms of correct dimensions to change the direction of the rising rays of light that diverge outward in all directions and produce glaring effects. In constructing this lens it was predetermined that the ideal limits of light rays should have a spread of 21 ft. at a distance of 100 ft. ahead of the car. To confine all the light rays within this prescribed space the lens was constructed with the prisms running in the manner shown in the illustration. The top prisms are ½ in. wide, while those on the bottom which run in the opposite direction are 2 in. wide. On the reverse side of the lens are prisms which run vertically. These are to spread the light laterally especially useful in country driving and turning corners. The Osgood Long-Distance lens comes in all sizes and can be installed quickly. Osgood Lens & Supply Co., Chicago.

Parabolite

The Pittsburgh Parabolite is a non-glaring spotlight. The feature of this light is the vertex curve. With an ordinary reflector the use of a shield cap which would keep the direct rays out of the eyes and would also cause the loss of the light ordinarily projected from that portion of the lamp, leaving a dark center in the projected beam. In the Parabolite the direct rays cannot pass beyond the edge. All light striking the surface is thrown out in a parallel beam. All light striking the vertex is redirected to the generated surface, thence into the beam. Thus no light is wasted. The non-glare shield is of highly silvered brass, firmly held in position. The lamp itself is 7 in. in diameter and comes with bracket, diminishing mirror, etc. Price, $7.50. Pittsburgh Electrical Specialties Co., Pittsburgh, Pa.

Sun-Ray

The Sun-Ray lens is a new product which both diffuses and refracts the



Macbeth lens with visor

light, shooting a long concentrated beam of light far ahead of the car. Not only does it do this but owing to its peculiar formation it spreads the light laterally, a useful feature in driving over country roads and in turning corners. It is stated that the Sun-Ray gives a side diffusion of 168 deg. Price, per pair, $1.75. Prismolite Co., Columbus, Ohio.

Saferlite

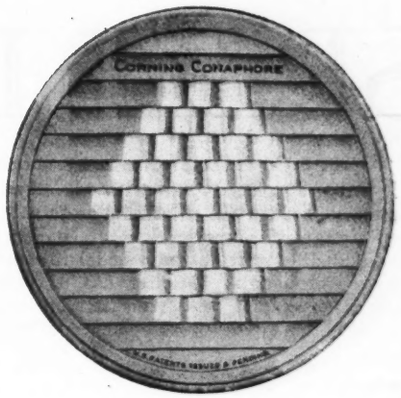
The upper inner surface of the Saferlite lens consists of horizontal prisms, eight to the inch, designed to deflect the upward rays of light toward the roadway. The lower inner surface consists of vertical cylindrical projections, also eight to the inch, designed to spread the downward light sidewise. The outer surface of the lens is perfectly smooth. The nature of the lens is shown in the illustration. The upper light is deflected downward, with the top of the beam horizontal. Saferlite lenses come in sizes from 8⅛ in. in diameter to sizes over 10 in. Price, from $1.50 per paid to $2.25. Saferlite Lens Co., New York.

Shaler

The Shaler Roadlighter is said to make night riding safe by giving an intensified bright light which is evenly distributed by prismatic refraction on the road. At a distance of 200 ft. ahead of the car the light on the road is approximately twice the intensity of that from a bulb of the same candlepower projected through a clear glass reflector. The prisms are so arranged that light is thrown not only downward but laterally as well. They are made for all sizes of lamps, with special size for Fords and smaller. Price, large sizes, $3.50; small size, $2.75. C. A. Shaler Co., Waupun, Wis.

Stewart

The Stewart lens is so constructed that complete illumination is given, as the light is diffused before it reaches the deflector, it is stated. The diffusing element consists of a cup-shaped glass bowl which surrounds the light bulb, fitting around the bulb stem

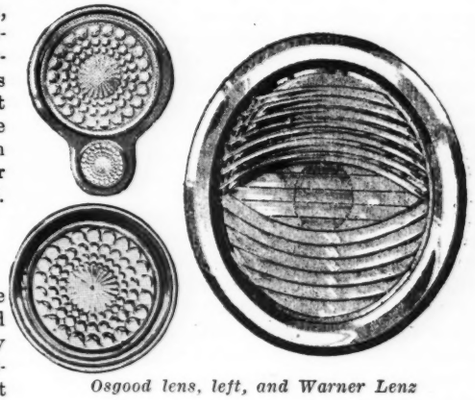


Corning Conaphore lens

at the back. The outer surface of the bowl is covered with a series of semi-spherical shaped elevations, while the inside is ribbed. The device is applicable to any make of lamp. To install it requires removal of the lamp bulb, while the bulb stem is placed through the back of the Stewart lens, whereupon the two are replaced in the headlight. One size is offered to fit all lamps. Price, per pair, $2. Stewart-Warner Speedometer Corp., Chicago.

Stryker

The Stryker headlight deflector is a metal shield to attach to any 2-in. bulb. It is designed to reflect the light rays downward and complies with all laws, it is stated. In attaching it care must be taken to have the points of the main body of the deflector at the bottom of the bulb. It is also essential that the headlights be adjusted to a perpendicular position or, in some instances, inclined slightly forward at the top. Price per pair, $1.50. Stryker Deflector Co., Inc., Buffalo, N. Y.



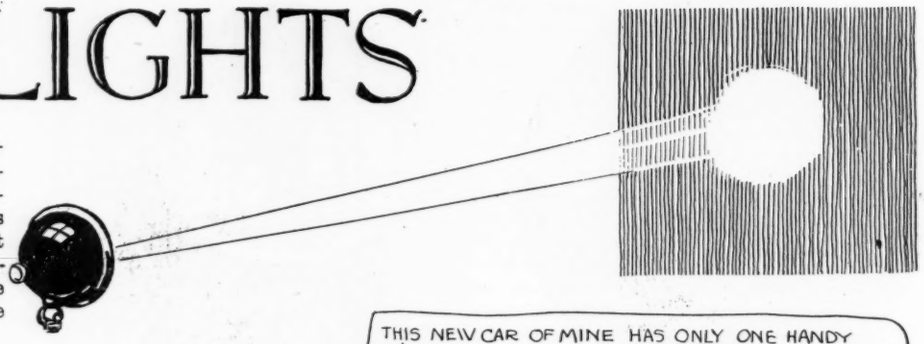
Osgood lens, left, and Warner Lenz

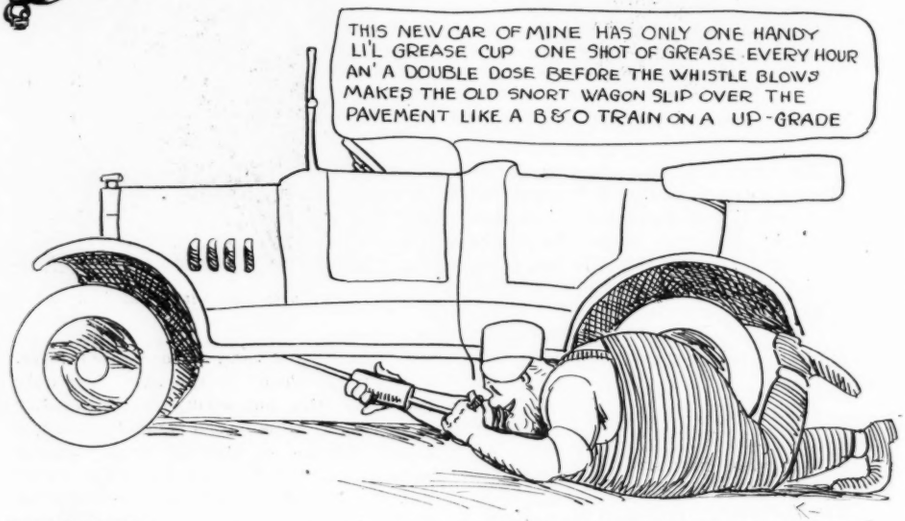
Warner

The Warner lens, which has been adopted as standard equipment on Packard, Marmon, White and other makes, is of the diffusing type. It is constructed with surface having semi-spherical projections arranged concentrically about its face. In the center is a small circular space in which the projections are arranged radially. The Warner lens is said to comply with laws in all states and aside from its non-glaring qualities affords an excellent driving light on great brilliancy. It comes in all sizes from 5 in. in diameter up to 12 in. Price, from $3.50 to $5. Warner Lenz Co., Chicago.

SPOT LIGHTS

UNCLE SAM'S requirements for standard spotlights to use with his standard trucks caused the chief change in spotilght design this year. Several concerns have added an extra sturdy model to meet army requirements. Greater use of non-glaring lenses and rear view mirrors are the other important developments of the season.




THIS NEW CAR OF MINE HAS ONLY ONE HANDY LI'L GREASE CUP ONE SHOT OF GREASE EVERY HOUR AN' A DOUBLE DOSE BEFORE THE WHISTLE BLOWS MAKES THE OLD SNORT WAGON SLIP OVER THE PAVEMENT LIKE A B&O TRAIN ON A UP-GRADE

Stewart

The Stewart V-Ray searchlight was added during the year. The light is small, making possible the use of two, one on each side of the car, in place of headlights or dimming devices. It is designed for installation on either side of the windshield and so shaped that storm curtains can be fastened to the windshield around the bracket. A three-point suspension bracket makes it possible to swing the light through a complete circle in any direction. The body is 6 in. in diameter and is almost cylindrical. A 6-in. curved lens is used, with a rearview 3½-in. reducing mirror and switch within convenient reach. Price, $5 with mirror. Stewart-Warner Speedometer Corp., Chicago.

Autoreelight

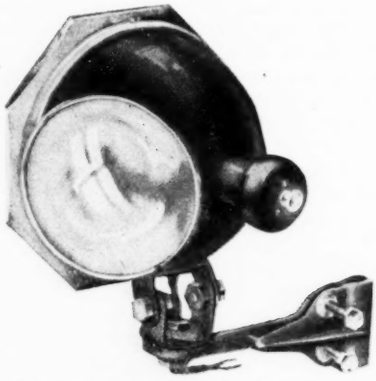
The Autoreelite is a combination spot light and portable trouble lamp. An adjustable cord reel is located in the ball casing just back of the lamp and forms a part of the bracket. To use as a trouble light it is only necessary to unscrew the knurled nut and withdraw the lamp to any desired length up to the limit of the cord, which is 12 ft. long. Finish is black enamel. A clear glass lens is backed by a 21-c.p. nitrogen bulb in a silvered parabolic reflector of contour carefully determined to increase the light rays. A 3½-in. reducing mirror is 50 cents additional, the light costing $7.50. Anderson Electric Specialty Co., Chicago.

Culver-Stearns

The Culver-Stearns spotlight has a diameter of 6 in. The rim is brass and the body bracket and handle pressed steel. It is known as the Giant and has a bulb of 21-cp. nitrogen. Little cord is necessary to turn the light in different directions, since the light is fitted close to the windshield. The switch is located in the handle. The Giant is furnished with mirror at $6 and without at $5. Culver-Stearns Mfg. Co., Detroit.

Gray & Davis

The Gray & Davis long-distance spotlight maintains its beam of light by an accessible adjustment. A feature is the stay-put joint. The wires are carried down through the bracket attachment, eliminating swinging wire, and the finish is black with nickel door. The reflector is parabolic and plated with silver. Nitrogen bulbs and diminishing mirror are fitted. Several searchlights for trucks are offered with specifications that are fitted to army use. These are $12, while the spotlight described is $7.50. Gray & Davis, Inc., Boston, Mass.



Kilborn Sauer spotlight with mirror

Kilborn-Sauer

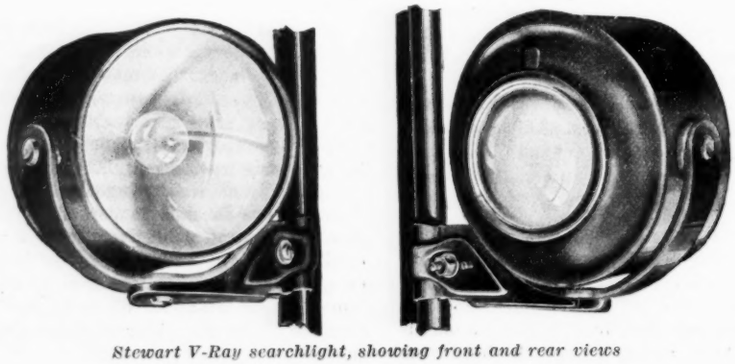
The new Kilborn-Sauer of 1917, built substantially for long service and known as No. 110M, has been continued and will sell at $10. This is an 8-in. type with an improved bracket that fits a square windshield as well as a round one. In addition two other spotlights are offered, at $9 and at $6. Model 112M, the highest priced, has an octagonal front, while the other two are round. Diminishing mirrors are included. Kilborn-Sauer Co., Fairfield, Conn.

Delta

The newest Delta spotlight is mounted on a two-point suspension bracket and has an instantaneous outside focusing arrangement. The front glass and bulb can be removed easily and the entire device is adjustable for a slanting windshield so that the light is always in an upright position. Finish is high-grade enamel with heavily-plated parts. The windshield clamp fits any car and has a vise grip. A 21-cp. nitrogen bulb is used. The reflector has a diameter of 5½ in. Price, with mirror and cable, $7; without mirror, $6.50. Delta Electric Co., Marion, Ind.

Cellbeam

The Cellbeam concealed spotlight is a small but powerful projector that gives a double ray, one a main beam extending 500 ft. and the other a non-glaring, diffused beam of comparatively wide angle that illuminates objects close at hand. The line also includes a few spotlights with brackets for those who prefer that installation. A marine-type light and 11-in. headlights, to order, also are offered. The Cellbeam



Stewart V-Ray searchlight, showing front and rear views

concealed spotlight is fitted for carriage in the side door pockets. The handle carries the switch, and focusing is by an external arrangement. Price, $8. Cellbeam Mfg. Co., Brooklyn, N. Y.

E. & J.

The Edmunds & Jones spotlights have been augmented during the year by an electric searchlight designed to meet the requirements of Government service. This light is adaptable to the army truck without change of construction. Finish is black and nickel. A combination oil-and-electric side and tail lamp is designed for the same service, with standard finish all black. Prices, searchlight, $19; oil-and-electric lamp, $4. Edmunds & Jones Corp., Detroit.

Foster

The Foster spotlight is called the Owl and is for installation on the windshield or other convenient place to supplement the fixed headlights with controllable driving light. A patented universal swivel joint is used and is said to be slip- and rattle-proof. Price, $5. C. H. Foster Accessories Co., Chicago.

Old Sol

Nitrojector No. 100 is the latest addition to the Old Sol line. It is a very powerful spotlamp with a cylindrical double shutter over the bulb to eliminate glare. This consists of two aluminum tubes, one sliding inside the other so that by advancing one glare can be eliminated. The bulb is focused instantly by turning a knob on the handle. A 4-inch diminishing mirror gives a rear view with the lamp pointed in the direction the car is going. The bracket is universal and unusually solid. The lamp comes equipped with 5 ft. of cable, nitrogen bulb and pilot bulb, switch and brackets. Price, $10; other Nitrojector windshield driving lights, No. 77, $5, and No. 70, $7, have quick adjustable focusing device, mirrorscope, universal bracket and other necessary attachments. Hawthorne Mfg. Co., Bridgeport, Conn.

S & M

The S & M are well-finished spotlights in different sizes and styles, No. 1, 6½-in. diameter, $8; No. 2, special, 7½-in. diameter, $10.50. A rear view "periscope" increases the price of either $1. A special model is made for Fords and operates directly from the magneto. It is equipped with a 24-cp. nitrogen bulb and is 6½ in. in diameter. Without mirror, $7; with mirror, $8. S & M Lamp Co., Los Angeles, Cal.

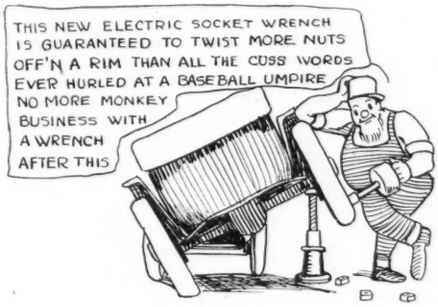
Howe

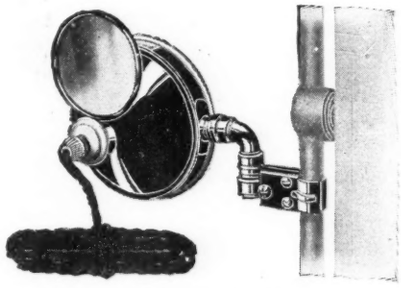
Two popular-priced models have been added to the Howe line. These are No. 5, which sells for $5.50, and No. 15, which sells for $4. No. 5 is similar to model 8, which sells for $8, and is a double shell lamp with baked-on enamel finish, 4-in. mirror, switch in the handle and spring-controlled bracket. Clamps are furnished in styles to fit any windshield frame. The lamp is 6 in. in diameter. The Howe Jr. No. 15 is a single shell lamp with a convex lens, 4-in. mirror, switch in the handle and a similar bracket. A full line of other lamps also is made. Howe Mfg. Co., Chicago.

Vesta

Different styles of Vesta spotlights are made for all purposes, both land and marine. Two popular styles are No. 193 and No. 197, the former being 7¼-in. diameter and selling for $8, and the latter, 6 in. in diameter and selling for $7. Both have 3-in. ground condensing mirrors and switch in the handle. Without mirror, the prices of both are $1 less. These lamps have a Cutler-Hammer switch in the handle. Universal brackets are used. Vesta Accumulator Co., Chicago.

THESE HERE BALL BEARIN' PIKE-POLE PET-COCKS MAKES PRIMIN' ON A FROSTY MORNIN' AS EASY AS TELLIN' THE KAISER WHAT A MESS HE HAS MADE OUT OF KULTUR


THIS NEW ELECTRIC SOCKET WRENCH IS GUARANTEED TO TWIST MORE NUTS OFF'N A RIM THAN ALL THE CUSS WORDS EVER HURLED AT A BASEBALL UMPIRE
NO MORE MONKEY BUSINESS WITH A WRENCH AFTER THIS



A Howe spotlight model

S. & M. spotlight

Autocelite, combination spotlight and trouble lamp

Victor

The Victor is a moderately-priced spotlight 7 in. in diameter and finished in black japan with nickel trimmings. It has a silver-plated reflector and the bulb is adjustable. The switch is in the handle. There is a 3-in. reducing mirror. Brackets are universal and will fit any windshield. Price, $5. Corcoran-Victor Co., Cincinnati, Ohio.

Red Spot

The Red Spot spotlight differs from others in that it has a partly transparent red cylinder surrounding the bulb in such a way as to eliminate glare and give a distinctive appearance. When desired, the entire beam of light may be made red as a danger signal. It is equipped with a rear view mirror and the bulb has a focusing arrangement. The bracket is a universal type. Price, without mirror, $6.50; with mirror, $7. F. W. Wakefield Brass Co., Vermilion, Ohio.

Indiana

The Indiana spotlight is 6½ in. in diameter and has a true parabolic silver-plated reflector. The switch is conveniently located and the bracket is a universal type. A diminishing mirror is built into the back. The lamp is finished in black japan with nickel trim. Indiana Lamp Co., Connersville, Ind.

Superior

The Superior spotlight is equipped with 10 ft. of cord so that it can be removed from its bracket and used as a trouble lamp. The switch is in the handle, making the controlling of the lamp very simple, and a rear view mirror is integral with the bracket.—Pittsburgh Lamp, Brass & Glass Co., Pittsburgh, Pa.

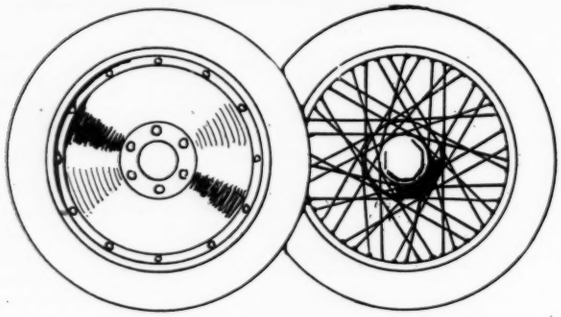
Solar

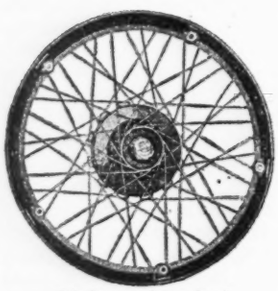
The Solar searchlight is mounted on a frictional bracket of the universal type together with a rear view mirror. The switch for the lamp is in the handle of the lamp, which is regularly equipped with a 21-cp. bulb. The lamp with mirror in black and nickel finish sells for $7.50 and $6.75 without the mirror. The all-nickel lamps sell for $10 and $9.25.—C. M. Hall Lamp Co., Kenosha, Wis.

Rico Pedal Covers

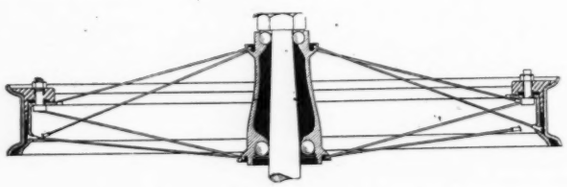
The Rico pedal covers are made in two sizes to fit all makes of square and oblong pedals and can be adjusted with the fingers. There are no holes to drill and no bolts to loosen. They can be made to fit concave and convex pedals by bending with the fingers to conform to the shape desired. They also fit many styles of pedals on commercial cars and trucks. Price, large, $1.75; medium, $1.50, a pair. An adjustable accelerator foot rest also is offered. H. C. Rich Auto Accessories Co., New York.

WIRE *and* DISK WHEELS

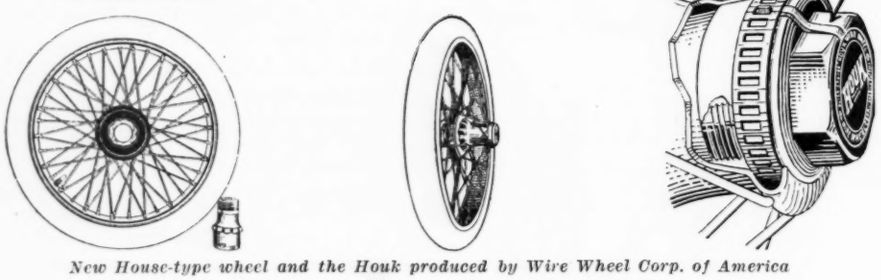




Lindsay wire wheel



Cross-section of Grant wire wheel



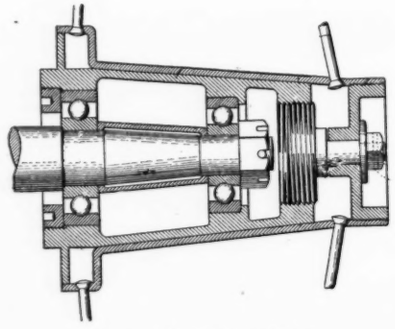
New House-type wheel and the Houk produced by Wire Wheel Corp. of America

Houk

Several improvements have been made in the Houk wire wheels during the year. A new locking ring is used and a House-type wheel is offered. The drive pin holes and spokes are reinforced and the parts are given a special rust-proofing treatment. Houk wheels are made in various sizes with plain clincher and quick-detachable rims. A special set for Ford cars is included. The wheels are held in place by a hub cap that turns tighter as the car advances and which is threaded internally with the outside conical or tapering. The original bearings are used when changing from wood to wire wheels. Cleaning with application of a light film of grease to certain surfaces is advised every 1500 miles. The hubs, spokes and rims are treated by a special process that makes the entire wheel rust-proof. Wire Wheel Corp. of America, Buffalo, N. Y.

Hayes

Drive in the Hayes wire wheel is by opposed tapers in the inside of the hub to the wheel proper and corresponding tapers on the inner hub and hub cap, assisted by six drive stubs permanently set on the inner hub. The drive studs engage covered bosses set in the hub shell. There is no opportunity for the wheel to stick and a change is made just as easily after driving 5000 miles as after a mile, it is claimed. The feature of the wheel is the ease with which it may be removed, in fact. Although no load is carried on the hub cap, it is only necessary to remove it to release the lock which holds the wheel to its hub. Castle & Kyte, Detroit, Mich.



Cross-section of Kelly hub

Pasco

The design of the Pasco wire wheel uses a four-series method of rim punching and spoke lacing. By this method each spoke crosses four others, both inside and out, forming a strong double web which adds greatly to the strength and resiliency of the wheel. In the wheel for Ford cars twelve more spokes than usual are used, adding surface strength to the wheel and making it possible for use on commercial as well as passenger cars. The hub caps are from white metal casting which is rust-proof and does not tarnish. The safety latch has been changed, being made from one piece of metal now and so arranged in the end of the hub shell that it becomes locked securely in the ratchet of the cap and cannot loosen until released by someone. The latch is positive and will lock itself after the car has been driven a few feet if it is not secured by someone. Complete sets of bearings are furnished with the Ford wheels. Wheels are also fitted to Maxwell cars. Those for the Ford are $75 for a set of five in black enamel; for the Maxwell, $100 for a complete set in white or black enamel. Colors are optional at $5 extra for a set. Pasco wire wheels are standard equipment on the 1918 Maxwell sedans. National Wire Wheel Works, Inc., Geneva, N. Y.

Kol-Ben

The Kol-Ben De Lux demountable wheel is simple in construction, making wheel changes easy and quick. A slight turn of a light wrench removes the wheel, and there are no loose parts to be mislaid or lost. The extra wheel fastens to the side or rear of the car in the same manner that it fastens to the axle. No straps or clamps are required. The inner lock is rigid, oil-proof and protected against dust and moisture. A special process of Wise electric sherardizing renders it rust-proof. The wheels are supplied in wire, wood and steel for all cars and are finished with a hard and tough baked enamel in black, white and colors. Prices, set of five in black for Ford car, $70; in colors for Ford car, $75; rear tire carrier, $10; side tire carrier, $6. Kol-Ben Wheel Co., Detroit.

Lindsay

The Lindsay demountable rim wire wheels are for Ford cars. The hubs are of specially prepared pressed steel and have few parts. The brake drum is so constructed that the spokes attach on the outside of the brake, making it simple to replace the spoke at any time without disturbing or even removing the wheel from the axle, as the brake itself fits on the inside, the braking surface being on the inside of the spoke line of the wheel. The spokes are heavy .175 gage, drawn-steel wire, swedged and threaded to sufficient length to give the heavy steel nipple used as strong and full

a grip as possible, being laced and crossed for strength. The four wheels and extra rim to a set weigh about 150 lb. ready for shipment. Price, $45. Great Western Mfg. Co., Laporte, Ind.

Simplicity

The Simplicity demountable wheel outfit consists of four steel ring retainers, twenty-four high-test steel bolts with hand-turned threads, twenty-four dome nuts Parkerized, a socket wrench, spare wheel and special patented wheel carrier. By removing six of the dome nuts on the outside flange of the wheel and pulling the wheel off the hub, the entire operation of changing can be done in 4 min. or less, it is claimed. Simplicity Wheel Co., Grand Rapids, Mich.

Grant

The Grant wire wheel replaces the stock wood wheel without a special hub or bushing. It is not demountable, but a demountable rim is used for tire changes so only four wheels need be purchased, the spare parts being carried on a demountable rim as with stock wood wheels. The spokes are laced with equal tension at all times and side thrusts do not injure them, it is said. Grant Wire Wheel Mfg. Co., Chicago.

Dayton

The wheels in a set of Dayton wire wheels are interchangeable and the inner hub mountings for the axle spindles so arranged that any wheel can be changed from one position to another with the unscrewing and replacing of the hub cap. The wheels are laced with the system of balanced triple-spoke lacing. The spare wheel is carried with inflated tire and can be applied to any of the hubmountings. A set consists of five wheels and four inner hubs. Dayton Wire Wheel Co., Dayton, O.

Spranger

The simple lock on the Spranger wire wheel has been replaced by a floating lock nut arrangement. The lock lugs fit securely on the base of and against the rear wall of the channel. The wheel has a patented rim construction, which does not ride on the bolts, and the spokes are laced rigidly and accurately into a steel channel structure. A set consists of four wheels and an extra rim for mounting the spare tire. Standard finish is black enamel, though colors are optional at extra cost. Spranger Wire Wheel Co., Detroit.

Kelly

The Kelly demountable wire wheel is a new product with inner hub member mounted to rotate and an outer hub member adapted to be telescoped with the inner hub member and secured in position on the latter to rotate with it. The Kelly patented feature provides a means whereby the outer hub member can be applied and removed readily to and from its operative position on the inner hub member. The outer surface of the outer hub member and the inner surface of the outer hub member are tapered. A single spindle device operates to force the two members into engagement or to separate them, depending on the direction in which it is rotated. In brief, the hub is such that applied as a quick-demountable wheel the change can be made in less than 10 sec. without removing the hub or using tools, it is claimed. John Kelly, Chicago.

Disteel

The Disteel disk wheel contains few parts. A cast steel hub fastens to the axle, and the pressed steel disk is secured to this by slipping over the four studs on the permanent flange. The wheel is held in place by a wheel-locking flange which carries the four nuts and their washers in a self-contained unit. The rim is integral with the dished steel flange and has an outer ring held in place by eleven nuts. This permits extreme line-in of parts without loss of strength and leaves the casing entirely free when removed. The disk and rim are ordinary 25-point carbon blue annealed steel, the flange varying in thickness from 3/16 to 3/32 in. The wheel weighs less than the universal wood or wire wheel. Absolute rigidity is removed by a dished construction. The load line carries the disk, eliminating concentration at any definite point, and is carried both in compression and suspension over the entire surface. The cost is about the same as a universal wire wheel installation. Detroit Pressed Steel Co., Detroit.

Greer

The Greer wheel is a separable double-disk wheel that uses the clutch principle to bind the parts together. One nut holds the tire on the rim. Half the rim is put on the tire, the tire is turned over and the other half then is applied, after which the halves are squeezed together, the expansion ring snapped in, a washer put on the valve stem and a set nut screwed on. The inner disk is attached permanently to the hub when in use, and the rim is held between the disks. The tension in the upper half and the compression of the lower half of the wheel carry the load so that it is distributed over the entire surface of the spoke members, or disks. Erwin Greer Automobile Co., Chicago.

Miscellaneous

Rayfield Coupling

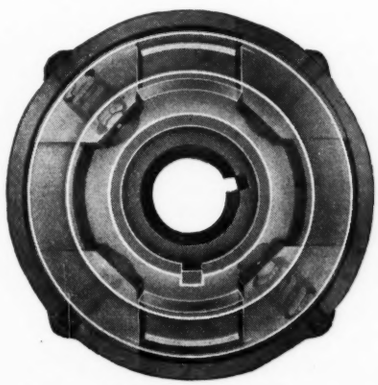
The Rayfield coupling is adaptable to all magneto, generator or pump-shaft drives and is similar in construction to the Oldham type except that it has an automatic spring to compensate for wear and to dampen noise. The center part of the coupling consists of a ring 2 in. in diameter with two triangular shaped steel blocks riveted to this ring, which is 3/32 in. thick. Placed midway between these two solid blocks are two blocks of similar shaped, loosely riveted and forced inward by small coil springs. Regularly constructed shaft end members, each with two projections or jaws opposite each other, are inserted between the blocks, thus forcing the loose blocks outward from their inner rivet heads by deflexing the springs. On account of the spring pressure, these loose blocks hug the jaws at all times and take up for any wear that may occur. This spring pressure also eliminates any rattle or back lash that may occur in the coupling. The universal action of the coupling is practically perfect and it is possible to use plain instead of ball bearings adjacent to the coupling. In the design of the coupling allowance is made for 1/32 in. wear which experience has demonstrated will be sufficient for 25,000 to 35,000 miles of service.—George D. Bailey Co., Chicago.

Ampeco Pistons

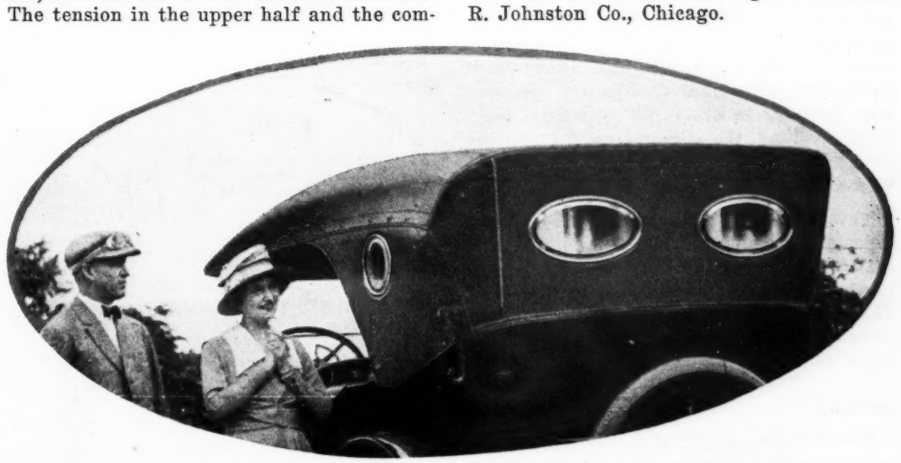
The Ampeco piston is designed specially for use in the Ford engine. In construction this piston uses three 5/16 in. rings, two of these being located above the piston pin and the other one acting as a scraper ring on the skirt of the piston. It is rather light weight and made from a fine grade of soft gray iron.—American Machine Products Co., Marshalltown, Iowa.

Johnston Plate Glass Windows

Johnston windows are made of beveled plate glass and are intended to be inserted in flexible curtains. They are mounted in flexible curtains by a neat metal rim and thus eliminate the difficulty encountered with the use of celluloid lights.—William R. Johnston Co., Chicago.

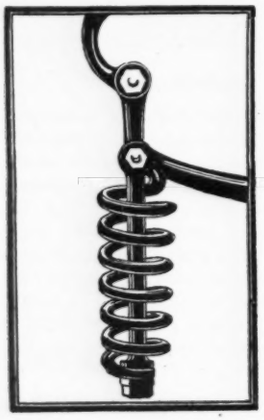


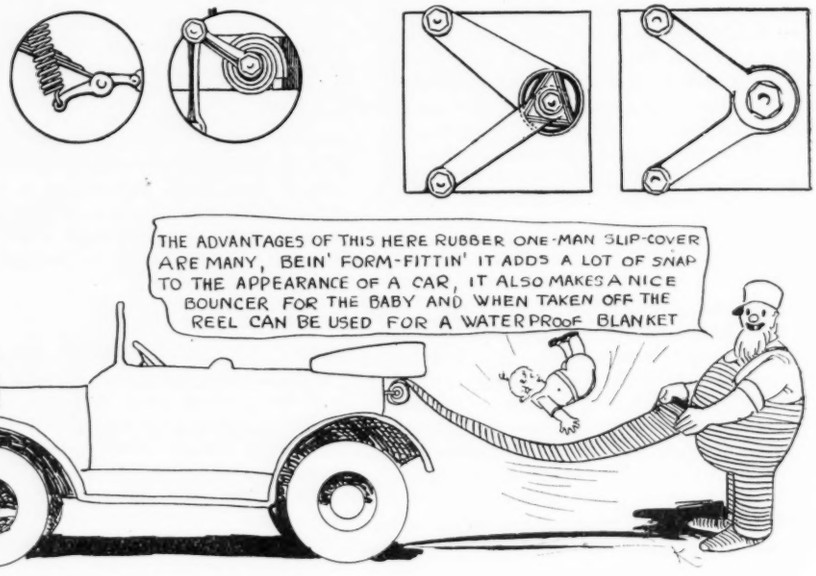
Rayfield coupling



Johnston beveled plate glass windows for flexible curtains

SHOCK ABSORBERS




THE ADVANTAGES OF THIS HERE RUBBER ONE-MAN SLIP-COVER ARE MANY, BEIN' FORM-FITTIN' IT ADDS A LOT OF SNAP TO THE APPEARANCE OF A CAR, IT ALSO MAKES A NICE BOUNCER FOR THE BABY AND WHEN TAKEN OFF THE REEL CAN BE USED FOR A WATERPROOF BLANKET

Hartford

The chief improvement in the new swivel-type Hartford shock absorber lies in the swivel connections which are fitted at the extreme ends of the arms, where they are attached to the frame of the car. These allow perfect freedom of the shock absorber permitting it automatically to align itself to the road surface, and thus a fine degree of control of the spring action is secured. The friction mechanism in the new model is the same in principle as that of previous models. Installation can be secured for any make of car. The prices vary from $30 to $60, depending upon the weight of the car. Edward V. Hartford Co., Inc., Jersey City, N. J.

Connecticut

The Connecticut is of the V-type, depending upon the resistance offered by the action of a three-faced cam against a series of flat springs arranged in a triangular shape to arrest the movement of the cam. Thus any movement of the car springs deflect the springs of the shock absorber and take up the inequalities of the road. Connecticut Shock Absorber Co., Meriden, Conn.

Gabriel Snubber

The Gabriel snubber remains practically the same as last year's, depending upon the action of a coil strap against a compression spring to dampen the rebound of a car and thus afford easy riding and freedom from vibration. This device is used as standard equipment on several well-known cars and sells from $9 to $15 a pair. Gabriel Mfg. Co., Cleveland, Ohio.

W & C

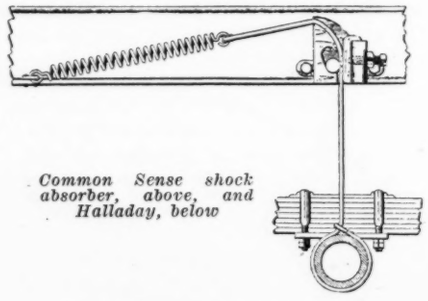
The W & C shock absorber is one made especially for Fords of the double-arm type in which two coil springs are attached to the mechanism to absorb the road shocks. The device is adaptable to either the Ford passenger or commercial car. P. H. Webber & Co., Hoopeston, Ill.

Johnson

The Johnson shock absorber has an adjustable spring recoil check which permits of a wide range of adjustment to suit the various weights of cars. This device can be attached to any form of spring suspension by removing the spring shackles and substituting the shock absorber in their place. Two springs are used in the construction of this absorber, one being the outside load coil and the other the inside check coil which dampens the rebound effect. Triple Action Spring Co., Chicago.

J. M.

The J. M. is a double-coil compression spring shock absorber which replaces the rear movable spring shackle when it is attached to a car. The object of the shock is to permit more freedom to the spring action and thus increase the riding qualities of the car. Thus by the addition of the J. M. the vibration rate of the springs can be almost trebled, giving more comfortable riding. The price of the device varies from $30 to $50, depending upon the weight of the car. The Ford model sells for $20 per set. J. M. Shock Absorber Co., New York.



Common Sense shock absorber, above, and Halladay, below

Hassler

The Hassler shock absorber is a spiral spring of chrome vanadium steel. It is attached very easily to the springs of the Ford car, for which it is made, by the Ford rear wheel puller. The device operates between the spring and the rear axle. R. H. Hassler, Inc., Indianapolis, Ind.

Velvet

The Velvet is a multiple-coil of shock absorber which is manufactured for cars with both the three-quarter and semi-elliptic types of rear springs. The road shocks are absorbed by the multiple compression springs in the shock absorber case by a sliding action. This concern also produces the Velvet Recoil Deadner, which is a device to check the up-throw movement of a car which has an unusual amount of rebound. The dampening effect is procured by the action of a spring on a moving cam. J. W. Blackledge Mfg. Co., Chicago.

Halladay

The Halladay Flexlever is a form of shock absorber made especially for the Ford car and can be attached to this make without any mechanical changes. Special designs of this type are also available for other makes of cars having three-quarter elliptic springs. This concern also makes a barrel type of shock absorber which can be attached to the rear springs. L. P. Halladay Co., Streator, Ill.

Cox

The Cox shock absorber has a triple coil consisting of three coils of various size which absorb the road shocks. The heav-

iest coil is constructed to handle the hard shocks while the small coil is to dampen the vibration with the intermediate coil acting between the small and heavy coil to equalize the effects. A piston which is capable of vertical movement in the cylinder acts as a guide for the spring action. Cox Brass Mfg. Co., Albany, N. Y.

Westinghouse

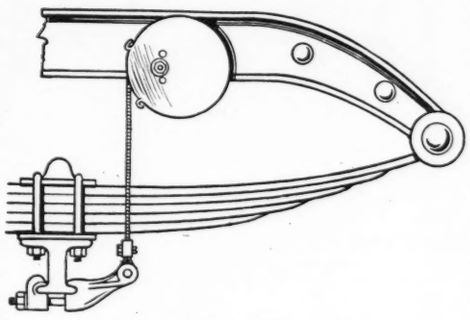
The Westinghouse is an air shock absorber which is adjustable for different loads by varying the air pressure and the quantity of oil in the cylinders. It is adaptable to being mounted on both the front and rear springs. Westinghouse Air Spring Co., Pittsburg, Pa.

Common Sense Shock Absorber

The chief part of this device is bolted to the frame at a point over the center of the axle. It consists of a jaw which passes a strap, one end drawn around the axle and the other end fastened by a small spring in the frame channel. When the car passes over a bump the coil spring pulls up the strap and on the rebound the jaws close, holding the strap fast and preventing a sharp return jolt. Price per pair for light and medium weight cars, $10; for heavy cars, $15. Common Sense Mfg. Co., Newark, N. J.

Sager

The Sager device consists of two coil springs which are housed in a steel case and when attached are substituted in place



Gabriel snubber, which is continued

of the rear spring shackle bolts. They are manufactured to fit any type of spring suspension. J. H. Sager & Co., Rochester, N. Y.

Naber

The Naber Stopshock springs are for Ford cars and are located between the spring and the axle to prevent excessive throws of the car due to rough roads. They are attached very easily and sell for $8 a set of four. Naber Stopshock Co., Chicago.

Mesinger

The Mesinger rebound check spring consists of a strap fitting over the axle and connected with a spring on each side of the axle. These springs are fastened to the frame of the car. There are two types, both single and double, and also a type made especially for the Ford. In the Ford type the spring is fastened to the frame with a strap running around the rear axle. H. & F. Mesinger Mfg. Co., New York.

Stone

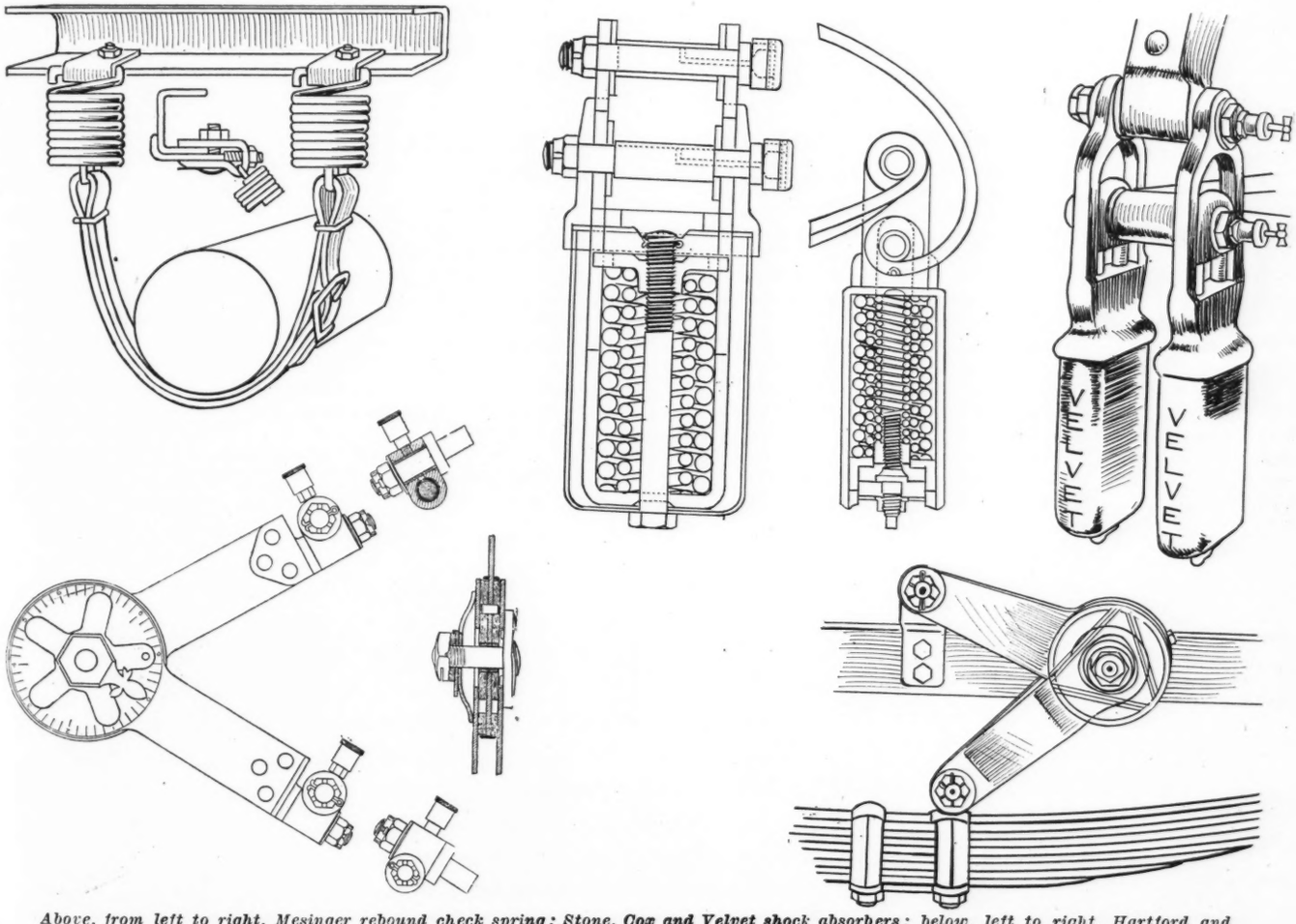
The Stone shock absorber has a double coil spring which is located within the cylinder of the device. The movable parts have a possible play of 2 in., which is said to be sufficient with the type of spring used to be effective against road shocks. The absorber is adjustable and made to fit all weights of cars and types of spring suspension. Stone-Thompson Co., Chicago.

R & R

The R & R is a cantilever type of shock absorber made especially for the Ford car. Due to its construction it very effectively absorbs vibrations and road shocks. The product is guaranteed and sells for $12 in a set of four. R & R Mfg. Co., Elgin, Ill.

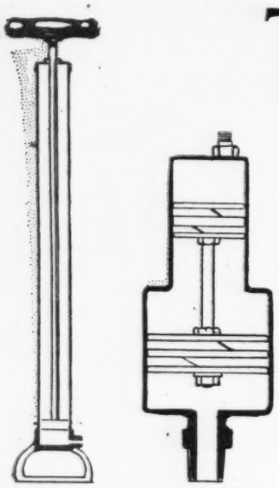
H. & D.

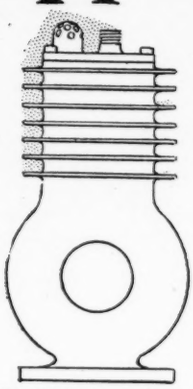
The H. & D. shock absorber is designed for use with Ford cars and consists of a lever suspended between the spring and axle with a movable suspension. The lever projects back of the axle to the center of the car, at which point it is fastened to a strong spring coil. All the road shocks are conveyed back to this spring which absorbs them. Price, per set of four, $10. H. & D. Co., Inc., Goodland, Ind.



Above, from left to right, Mesinger rebound check spring; Stone, Cox and Velvet shock absorbers; below, left to right, Hartford and Connecticut absorbers

TIRE PUMPS





Cassco

The Cassco pump is continued practically without change. It is an unusually compact design for a power-driven pump. The gear-shift locks automatically, eliminating danger of stripping the gears. Lubrication is by splash system with an overflow at the bottom of the crankcase which insures correct oiling. Both intake and exhaust valves are of the poppet type with the valve face ground to a perfect seat. The valves are tested to hold gasoline. The cylinder and crankcase are cast iron, the pistons aluminum alloy with two spring steel piston rings, and the crankshaft is of high-grade steel with a large bearing at each end. All fittings are supplied so the owner can install the pump with ordinary tools. Price, $15, with a Ford size for $10. Edward A. Cassidy Co., New York.

Crane

A patented alloy packing ring instead of the piston rings usually employed in power tire pumps features the Crane pump. The ring is a solid, continuous circle in which the joint has been eliminated to obtain an air-tight and oil-tight construction. Instead of being set into the moving piston the packing ring is stationary and the piston moves through it. By slightly turning the cylinder, which is threaded into the crankcase, the ring is compressed so that it hugs the piston more closely. Adjustment thus can be varied to compensate for wear and increase the compression, the adjustment being possible while the pump is operating. The arrangement of the ring between the piston and cylinder walls prevents any leakage and oil cannot get into the compression chamber, and hence cannot reach the inner tube. Price, $10. Bay State Pump Co., Boston, Mass.

Detroit

The Detroit pump is driven directly from the front end of the crankshaft and is attached in the same manner that one would attach a hand crank when needed. A clamp locks it in position. A poppet valve inlet is used. Flexible hose and pressure gage are included in the equipment. Each downward stroke of the piston draws in the air, and each upward stroke forces the air through the tube to the tire, an accurate indicator gage insuring the correct amount of air. A high standard of workmanship is observed throughout in assembling the pumps, and a supporting place tends to prevent all breakage. Each is tested to fill a 1000-cu. in. tank at 70 lb. pressure in 4 min. Detroit Accessories Corp., Detroit.

Taylor

The Taylor pump is crankshaft operated. For use it is attached in place of the hand crank and is driven from the front end of the crankshaft. The piston is operated by an eccentric on the pumpshaft inside the housing. The reciprocating motion imparted to a metal rod by the crankshaft causes the diaphragm of rubber across the air chamber to move up and down and pump air. The inlet valve is poppet type and the exhaust valve ball type. Price, $10. Taylor Mfg. Co., Redford, Mich.

Kellogg

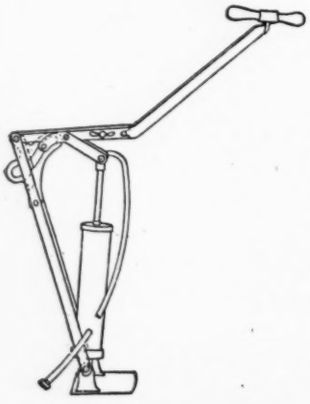
More than twenty-five makes of cars carry the Kellogg engine-driven tire pump as regular equipment, and it is available for practically all makes of cars either in engine or gearbox application. It is driven by gears thrown in mesh by a lever which is a part of the pump assembly. The pump is air-cooled and employs poppet valves for both inlet and outlet, these being in the head. The piston guides are attached to the drop-forged crankshaft. The two crankshaft bearings are oiled by splash, and a wick oils the cylinder and piston, each downward stroke of the piston compressing the wick. Two- and three-cylinder hand-operated tire pumps have superseded the single-cylinder pump in the Kellogg line, on account of the greater efficiency and ease of working. These are equipped with stuffing box packings prepared by the company's process and easily replaced or renewed. The two-cylinder pump is provided with a 20-in. hose and the three-cylinder with 36-in. Kellogg Mfg. Co., Rochester, N. Y.

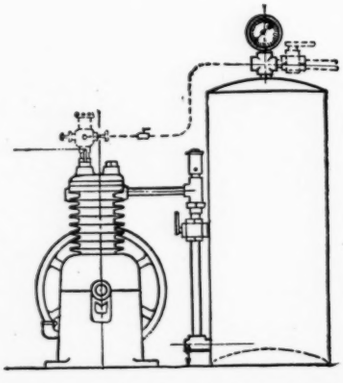
Brown

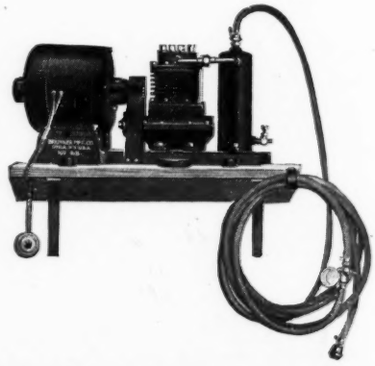
Although the Brown tire pump is operated in a spark plug hole the action of the pump prevents the taking in of gases, due to the breaking up of the vacuum of the engine by a special breather valve. A stationary pin in the hose coupling eliminates back pressure in tire valves. The pin projects low enough to strike and hold open the plunger in the tire valve. Brown Co., Syracuse, N. Y.

Mayo

The Mayo line consists of single and compound hand pumps, spark-plug and valve-cap pumps, a special plug pump for Fords, a compound lever-operated pump and a single-cylinder and double-cylinder air compressor, with other garage supplies. The newest addition to the line is the E-Z-Quick tire pump, easy because it is a small diameter pump, thereby reducing the piston air and resulting in high air pressure with much less effort in pumping.







From left to right, the pumps are the J-K Lever, Curtis air compressor, Au-To air compressor

The piston works freely inside the barrel and has a large size air valve in the center, through which the barrel is supplied liberally with air to capacity. A 22-in. barrel enables the operator to take a long, full stroke. Length over all is 25½ in. and weight 3¼ lb. Price, $2.50. Mayo-Skinner Mfg. Co., Chicago.

Manzel

The Manzel line of three pumps is continued. These are a two-cylinder, a single-cylinder and a small pump for Ford cars. In general, the Manzel pump is an all-metal, air-cooled construction with a screened inlet and ball outlet valve. The pumps are installed on the side of the engine and are driven by a gear from the water pump or magneto shaft in most cases. Lubrication is by splash, and an air filter keeps oil and dirt from the tube. Practically all makes of cars are fitted. It requires about 3 min. to inflate a 34 by 4 tire to 80 lb. pressure with the double-cylinder pump and about 4 min. with the single-cylinder. The Ford special will inflate a tire in 2 min. to 65 lb. pressure. Manzel Bros. Co., Buffalo, N. Y.

Master

The Master pump for the coming year has an increased stroke which gives it a greater inflation capacity of 70 lb. in 3 min. The pump is die-cast with hardened steel pistons. No packing or packing rings are used. Lubrication is by splash and automatic. Inlet valves are poppet type and outlet valves of the ball type. One-cylinder and two-cylinder types are offered, either clutch or gear-driven. Equipment includes 14 ft. of rubber hose and tire pressure gage. Hartford Machine Screw Co., Hartford, Conn.

Utility

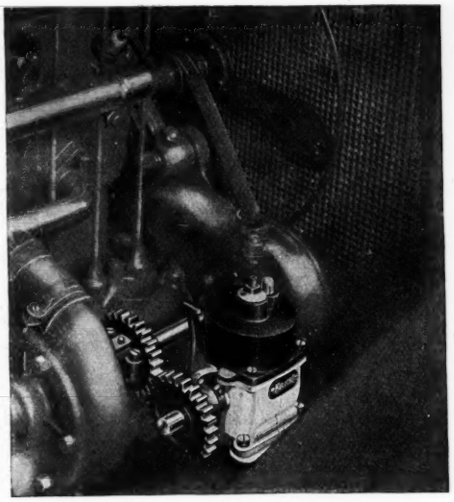
The Utility is a spark plug pump that is offered in two sizes. One of its features is the pneumeter, which acts as a kind of pressure relief valve. To pump a tire the pump is inserted in a spark plug hole, two squirts of oil are given and the engine started with the pneumeter at the correct poundage. The pump will inflate up to the mark set and then the air is deflected automatically to the outside and a small whistle sounds. The Utility Junior is adapted to small cars of 3½ in. diameter and less, while the regular type is adapted to cars of all weights and tire sizes. Hill Pump Valve Co., Chicago.

Curtis

The Curtis air compressors are single-cylinder and air-cooled. The line includes five sizes of compressors and three arrangements of electrically-driven outfits, each arrangement made up with the compressors and different sizes of tanks optionable. The compressor is very simple in construction. Lubrication is by splash system and a fan flywheel assists in cooling. Both the intake and discharge valves are in the top of the cylinders. The combinations make it possible to supply models ranging from a small $22 compressor to a large $300 electrically-driven outfit. Curtis Pneumatic Machinery Co., St. Louis, Mo.

Lectroflater

Two new products have been added to the line of the Lectroflaters, which are among the most compact garage aid pumps



Typical Kellogg installation

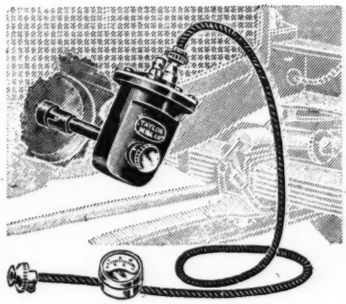
on the market. The Lectroflater is a combination of an electric motor with a single-cylinder air pump, pressure gage and tubing. Motor, compressor and transmission are inclosed in one frame. It will run from any lamp socket with direct or alternating current correct voltage. The two additions are a carriage outfit for use in garages and salesrooms, where it is desirable to take air to the car rather than move the car to the air, and a new model. Lubrication is automatic. Little attention is required. Packing with grease is necessary only four times a year. Prices range from $65 for the No. 1 hand Lectroflater to $335 for No. 3 portable tank outfit. Black & Decker Mfg. Co., Baltimore, Md.

Brunner

Brunner air compressors are of the two-cylinder vertical air-cooled type. During the year a stationary model designed for installation on a wall bracket in small public or private garages has been added to the line. This compressor is a two-cylinder type and delivers 1¾ cu. ft. of air a minute and 125 lb. pressure. The motor is geared to the compressor by a compressed cloth pinion gear, and the compressor is piped to the oil separator with a heavy copper pipe, making a compact and substantial unit. The compressor has three metal rings on each piston, and the motors are ¼-hp. compound-wound, direct-current and repulsion-induction type alternating current. Brunner Mfg. Co., Utica, N. Y.

U. S.

The two-stage air compressors are of horizontal air-cooled type built with two cylinders or with a duplex set of four cylinders. In them resistance is reduced to a minimum with relative increase in general efficiency, it is claimed. The piston in the low-pressure cylinder takes in air at high atmospheric pressure as it moves to the left and on its return this air is forced through the inter cooler into the high-pressure cylinder, being raised to 40 lb. pressure. This is the first stage. The second is when the piston steps up the air again to a very high pressure and forces it through the filtering trap to the tank. Cylinders and crankcase are cast in block. An intake silencer is another feature. An inter cooler cools the air passing from the low-pressure to the high-pressure cylinder, assisting in general cooling of the machine. Lubrication is by splash, and a safety valve automatically prevents overcharging of the tank. United States Air Compressor Co., Cleveland, Ohio.



Taylor power pump

J-K Lever

In the J-K Lever foot pump the leverage increases as the pressure increases toward the bottom of the cylinder. The pump is a single-cylinder design in which the stuffing box is eliminated. Construction is pressed steel throughout, making for a light, compact and strong pump. Folded, the pump folds into the tool box or under the seat. Jensen-Kohlert Mfg. Co., St. Charles, Ill.

Rose

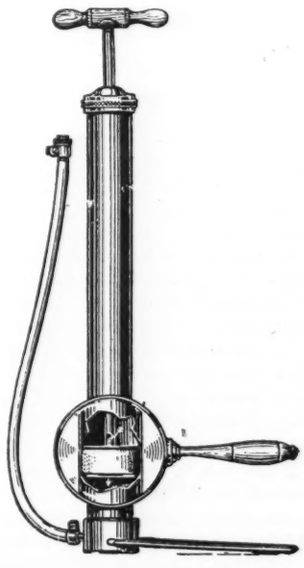
A patented valve features the Rose tire pump, one of the products that make up the line of Rose pumps, grease guns and belts. Unusual ease of operation is claimed for the pump through the utilization of this valve. J. H. Haney & Co., Hastings, Neb.

Gardner

The Gardner garage pump is an air-cooled pump made in either portable or stationary outfits of various capacities. The pump delivers air free from oil. Some of the outfits are of the automatic pressure type in which the pressure is regulated automatically within certain limits.—The Gardner Governor Co., Quincy, Ill.

B-W

The B-W tire pump, for Ford cars is one that can be attached to the forward end



Rose hand pump

of the engine and driven from the fan belt by a friction wheel. The pump is a single-cylinder machine, the piston being fitted with three rings and the intake and exhaust accomplished by check valves. It is said that a pressure of 60 lb. can be attained in about 3½ min. with the pump. Price, $6.50, with hose and tire gage as equipment.—Bloom-Wallace Co., Detroit.

Lippman

The Lippman four-cylinder portable air pump is noted for its compactness. The cylinders are cast in block with detachable head. The pump is mounted on a variety of portable types and provided for permanent wall or floor mounting for electric motor or line shafting. Lippman Air Appliance Co., Beloit, Wis.

Badger

The Badger bumper comes in a variety of sizes and styles to fit all makes of cars. The Cloverleaf is adjustable to all cars with extended frames. The Presto model is for cars with interfering mud aprons. The fitting can be attached without drilling holes in through the mud apron. It is held firmly by two set screws at the bottom of the frame. There is also a special bumper for the Dodge Brothers. Prices, from $6.50 to $11.—Auto Parts Mfg. Co., Milwaukee, Wis.

Tire Protectors

Kimball Steel Armor

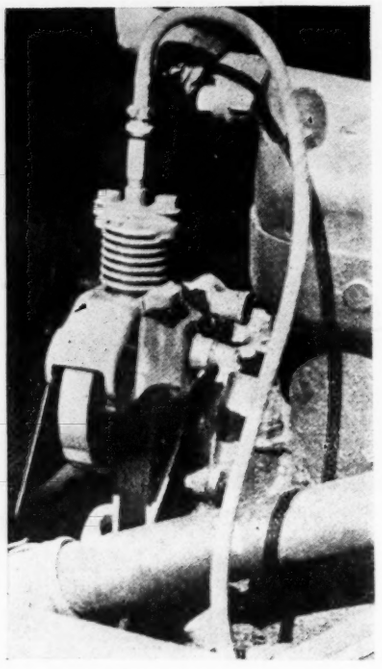
A tire protector made of steel links on somewhat the same principle as the flexible armor of the knights of old is the Kimball casing. It is made of flat steel links clipped together, put over the tire and hooked to the rim or fastened the same as the tire. Each section is 2 in. wide at the tread plate and it takes about fifty of these for a 32-in. tire. The tread plates are corrugated and hooks protruding through the plate prevent slipping. Of course, the tire is protected from stone bruises, punctures and blow-outs, and thus a tendency to long life is increased. It is claimed not to cut the tire but the steel imbeds itself in the rubber so that there is no tendency to creep, thus preventing heating. This tendency is further minimized by the fact that the steel carries the heat away from the tire readily.—Kimball Tire Case Co., Council Bluffs, Iowa.

Woodworth Treads

Preservation of casings and tubes by covering the casing with an armored leather cover is the purpose of the Woodworth tread. This consists of a leather casing studded with metal rivets which give a non-skid effect and whose wear is of indefinite duration. Security from tire cuts and blowouts and increase in life of the tire are the features of the tread. The manufacturer claims that the life of the tire is increased from four to six times, the only wear being the internal wear which takes place mostly in fabric and canvas of a tire and is the result of flexion due to improper inflation.—Woodworth Mfg. Co., Niagara Falls, N. Y.

Coffield Tire Protector

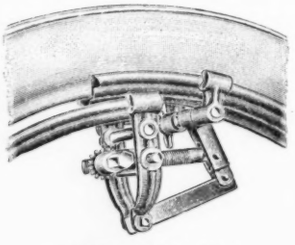
An inner liner designed to be used in new as well as old tires is the Coffield tire protector. It is made with the same care as a casing, wrapped around a steel cord and vulcanized. It is a thick crescent of rubber and thermometer reports from uses, it is stated, show the tires several degrees cooler than those without them. Increase in life is given as from fifty to 150 per cent. This increase in life is obtained, it is claimed, because the protector inserted between tube and casing acts as a support to the casing, preventing stone bruises and cushioning the blow. Also, the tires may be run softer without rim cutting on account of the supporting feature of the protector. The added thickness of rubber eliminates 95 per cent of the punctures, it is claimed.—Coffield Tire Protector Co., Dayton, Ohio.



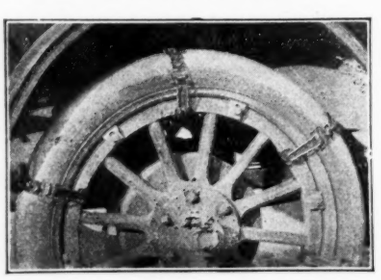
B-W tire pump

Fisher Rim-Grip Sub-Casing

An inner liner to be placed between tube and casing to protect the latter from rim cuts, blow-outs and punctures and to permit longer use of old casings has the special feature of two flexible steel rings which hold the subcasing in place and prevent chafing of the casing or tube.—Fisher Mfg. Co.



Elka split rim tool



Kimball tire protector

Kor-Ker Tire Treatment

A puncture sealer to be placed in the tube for automatically seeking out and sealing punctures and leaks by a coagulation of the compound is known as the Kor-Ker tire treatment.—Alcemo Mfg. Co., Newark, N. J.

Tire Sealers

Essenkay

Use of a resilient filling for casings to replace the air has been one of the methods often tried to eliminate tire troubles and increase tire life. The object of providing a tire which has the freedom from trouble of a solid and the cushioning effect of a pneumatic is worthy of all the effort that has been put on it. One of the methods offered as a solution is the Essenkay tire filler which is a resilient solid material claimed to have practically all the desirable characteristics of rubber without having rubber in its composition. That this filler, like others, decreases tire trouble there is no doubt. As to its riding characteristics, many users feel that such difference as there may be in the cushioning effect is more than made up for by freedom from tire trouble. In the matter of weight added by the filler, the filler supplied for a 30 by 3 tire weighs 18 lb., though this is claimed to be 10 per cent over the amount actually required.—Essenkay Products Co., Chicago.

Wonder Seal

A puncture sealer for pneumatic tires whose purpose is to close holes in tubes automatically through some coagulation process is known as the Wonder Seal. This is in the form of a liquid which is injected into the tube through the tire valve by a grease gun and the tire then pumped up to a riding pressure. Wonder Seal forms a coating on the inside of the tube which, it is claimed, will not drop to the bottom when the car is standing. It also is claimed that it will adhere to metal and therefore will not clog the valve. When a nail punctures a tire and is pulled out, enough of the Wonder Seal follows it to seal up the hole instantly. When a puncture is caused by a piece of glass or any substance which does not remain in the shoe, it is claimed that it will not be known that a puncture has been sustained so far as the tube is concerned. One of its functions is to increase the life of tubes through making the repair of small cuts unnecessary and prevent loss of air when tubes become porous. One of the unusual statements of the manufacturer is that it will enable blow-outs in the tube to be sewed up with ordinary needle and thread and to use the sewed-up tube like a new one. Two claimed features which will be appreciated by those who have tried similar puncture compounds are, first, that it will not close up the air valves and, second, will not spatter all over the car in case of blow-out. It sells at from $12 to $15 for a set of four tires, depending on the size of the car.—Wonder Seal Co., New York.

Marvel Tire Life

A puncture sealer for sealing up automatically holes in tubes is Marvel Tire Life, which is a semi-liquid composition inserted into the tube and occupying only

Twitchell air gage for tires

Snideman cap valve for tires

5 per cent of the air space. By preventing leakage of air it naturally increases the life of the casing as well as tubes. Reports from users indicate a doubling of the life of the casing and tripling the usual life of the tube. Ford car tires are treated for $2.50 and others in proportion to size.—Marvel Tire Life Co., Kansas City, Mo.

Tire Removing Tools

L & M Tire Tools

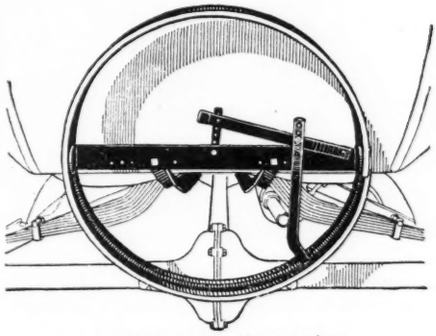
Special tools for making easier the removal of tires are features of the L & M line. One of these is called the Tire Shoe Loosener, designed to loosen rusted or frozen tires from rims with minimum effort. It is equally useful for any make of tire or rim whether clincher or quick-detachable and is so made that both sides of a shoe may be loosened with equal ease. It consists of a U-shaped piece which goes underneath the felloe, the fixed end resting against the rim and a movable end being pushed forward by means of a rack and lever. It weighs 2¾ lb., and is in two sizes, selling at $1.25 and $2.75. A Q D rim remover in the L & M line is designed to assist in removing and replacing quickly the steel rings of the Q D rims for tire changing. It consists of a toggle-joint clamp which is operated much like a pair of scissors. The clamp forces the inner ring away from the locking ring and becomes automatically attached to the rim, thus leaving the operator free to use both hands to remove the rim with an ordinary screwdriver. It is provided with a retaining block to be placed within the rim grooves in clamping the tool when the ring is not in place and can thus be used as a ring replacer. It sells for $1.50.—Adam A. Long Machine Works, Rochester, N. Y.

Eureka Rim Compressor

To aid in changing tires with split rim, the Eureka rim compressor has been designed. It is arranged to handle all types of transversely split rims of any size. It operates by a lever with an eccentric which gives a powerful shortening action so that it draws in the loose end of the rim and holds it there so that the tire can be removed or replaced easily. By reversing the operation, the rim is forced together when the tire is in place. The eccentric and long lever make it very easy of operation. Price, $3.50.—Eureka Rim Compressor, Inc., Addison, N. Y.

GTL Rim Tool

The GTL push-and-pull rim tool is a device for removing and replacing rims of tires. The bar travels in a C-shaped, heavily-ribbed channel that moves to and fro. The slot in the connecting link allows the bar to move backward for using tool inside rim to push it in place or lets the bar move forward to pull or contract the rim for removal from tire. The construction is substantial and only one screw is used in making adjustments. The tool fits any size split rim and comes in two sizes. Prices vary according to size and finish,



Hayes extra tire carrier

from $3.50 to $4.75.—Metal Products Mfg. Co., Minneapolis, Minn.

Lawco Rim Tool

A split rim contractor and expander to aid in tire changing with demountable rims which has the feature of three points of action instead of two is the Lawco rim tool. It is designed to operate with any type of transversely-split rim and operates with a long lever and toggle. The tool can be used to break open any sort of latch or to contract a rim or to latch it in place. In other words, the rim is designed to take care of the three necessary operations of tire replacement—breaking, contracting, and latching. It weighs 5½ lb. and can be collapsed to fit any tool box. One arm is adjustable and can be extended so that the tool can be used on any side of rim. Price, $3.50.—F. H. Lawson Co., Cincinnati, Ohio.

Safe-Loc Patch

Self-vulcanizing patches for tubes are finding favor with motorists on account of the small amount of labor required in repairing punctures and blow-outs in the tube. The Safe-Loc patch is a fabric patch with a self-vulcanizing cement and requires no heat or tools for making the repairs, the pressure and heat from the casing in action being sufficient. The patch is stuck on the tube, the tire pumped up and it is ready for use. The patch is made in sheets 6 by 8 in. in size. This is sufficient to patch 100 1-in. cuts or 250 nail holes and is

Roedding signal device, above, and GTL rim tool

supplied with the cement. The price ranges from 50 cents to $1.50, depending on the number of sheets.—National Auto Supply Co., Independence, Iowa.

Elka Rim Tool

A specially powerful tool for contracting and expanding split rims which is operated by a socket wrench is the Elka. It has two sets of jaws which can be attached, one on either side of the rim opening, and a very powerful contraction effort is provided by a worm and nut. By reducing the diameter of the rim the most obstinate tire can be removed quickly no matter how badly rusted.—Zinke Co., Inc., Chicago, sales agent; manufacturer, Elka Mfg. Co., San Francisco, Cal.

Weaver Tire Spreader

The Weaver tire spreader is a time- and labor-saving device which would be very useful in any tire repair shop. It opens the inside of the casing up in such a manner that it is available for a very thorough inspection and it is possible by this method to locate breaks and bad places in a casing which would not be discovered in the course of an ordinary examination. The machine is exceedingly well made, weighing about 60 lb. and selling for $20.—Weaver Mfg. Co., Springfield, Ill.

Tire Gages, Etc.

Twitchell Tire Gage

A Twitchell tire gage, of very handy size and shape for the pocket, is sold at $1.25. It is of the pencil type with an indicator bar which rises proportionately with the air pressure and upon which figures indicating the pressure are white on a black background, making them very easy to read. Notches in the indicator bar enable the pressure to be determined in the dark. A feature is the locking device which makes slipping of the indicator bar impossible and thus removes possibility of unaccurate reading. It is easy to carry, easy to read and hard to put out of order.—Twitchell Gauge Co., Chicago.

Schrader Truck Tire Gage

Increased use of pneumatic tires for trucks of large capacities has induced one of the larger tire supply manufacturers to produce a pressure gage designed specially for high-pressure pneumatics. It is known as the Schrader truck tire gage and it has a bent foot, or base, which permits it being applied to the tire valves of tires on heavy vehicles no matter how small a space between the hub and the felloe of the wheel. As the pressure in such tires must be very much higher than in tires on passenger vehicles, the indicating sleeve of the new gage is calibrated so as to register from 30 to 170 lb. This will accommodate tires up to 8½ in. As the necessity of keeping up tire inflation is even greater for commercial vehicles than for passenger cars the timeliness of the new Schrader gage is apparent. This, of course, is in addition to the complete line of accessories under this name, consisting of Schrader universal tire

valves, gages, pump connections, repair tools, etc.—A. Schrader & Sons, Brooklyn, N. Y.

Snideman Cap Valve

Improvement in air valves for tubes is the object of the Snideman cap valve whose feature is that it has no rubber seats and no springs, two of the features that are first to give trouble with the conventional valve. This is in the form of a cap which goes on top of the valve stem after removal of the inner works of the valve. Prices, 35 cents each; $1.00 per set of four.—Distributed by Gray-Heath Co., Chicago.

Edelmann Gage

The Edelmann tire pump gage is made in several styles and can be used either in the pump hose line or fitted with the company's automatic air chuck which enables it to be used directly on the tire valve stem. To operate this gage the rubber slip-on is connected over the tire valve and given a quarter turn, which engages the threads on the tire valve. These gages are nickel-plated and register up to 150 lb. pressure. E. Edelmann & Co., Chicago.

Pneumometer

A tire pressure gage designed for permanent attachment to the tire valve and which at all times gives an indication of the exact pressure in the tire is the latest development in tire gages. This is instantly attached in place of the dust cap, and the tire pressure at all times is clearly shown on a dial either during inflation or with the dust cap on. It is about the size and shape of a watch and replaces the dust cap. A set of four sells for $10.—Pneumometer Co., Chicago.

Hayes Tire Carrier

The Hayes tire carrier is for Ford and Chevrolet cars and consists of a flanged metal rim mounted at the rear of the car and holding the tire in much the manner of a clincher rim. A ridge in the rim presses the bands of the tire out against the rim flanges, holding the tire securely in place after it has been expanded by a lever. The lever may be padlocked in the expanded position and prevents mud and water from splashing into the tire. Price, single-tire type, $4; double type, $6.—Onguard Auto Necessities Co., Detroit.

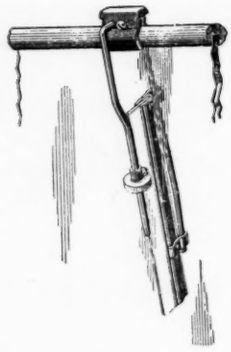
Smith & Gregory Carrier

The Smith & Gregory tire carrier is a combination trunk and rim carrier of thin sheet metal fastened securely to the car with iron brackets invisible from the front. It can be attached by the side or rear of the car. The rims are secured by wedges, eliminating straps. It takes only a few seconds to remove tires from the carrier. A locking device for the rims safeguards the tires. Price, $30.—James Martin, New York.

Truck Skid Chains

Arrow-Grip

Transverse chains with a block which locks around the spoke of truck wheels are known as the Arrow-Grip. They are single chains and not a complete set of interconnected chains as the more popular

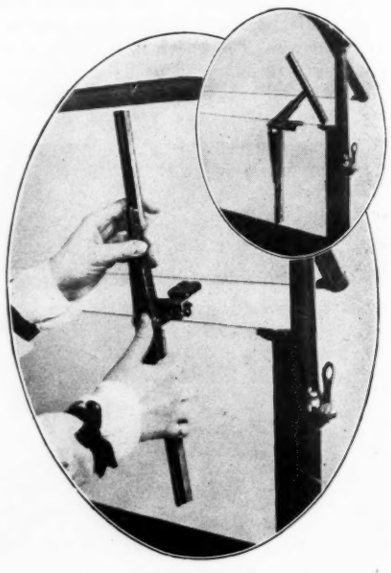


Outlook windshield cleaner

passenger car types. Each consists of a clamp which fastens around the spoke and carries either end of the cross chain which passes around the tire. It is simple in its attachment, the unit being easily attached to alternate spokes of the wheel. The spoke clamp is attached permanently by two bolts. The chains can be removed and replaced from hooks on the clamp very quickly and easily. These hooks are located where they can not be greatly clogged up by mud. The unit proper is a malleable iron casting lined with a pliable material to prevent marring the spokes. The only part of the device that is subject to wear is the cross chain itself and if one of these breaks as a result of wear it takes about ½ min. to remove the cross chain and apply a new one. One of the features is that in case the chain should break as a result of wear and become engaged in the drive chain or brake mechanism the broken section is released automatically so that there will be no damage to the truck. They are sold in sets to go on every other spoke of each wheel.—Arrow-Grip Mfg. Co., Inc., Glens Falls, N. Y.

Prest-O-Grip

Transverse non-skid chains for truck and solid tires which are featured by a special clamp are the Prest-O-Grips. The outfit consists of a rubber-lined clamp and two forged lock links to which are attached a chain which goes around tire and felloe.



Tri-Co rain rubber

The clamp is permanently attached to the spoke by wing nuts and the locks are patented devices guaranteed not to open accidentally. These are quite similar in principle to the type of lock which fastens the end of a popular passenger-car non-skid chain. A chain is fastened on every other spoke of the wheel. The outfit includes a clamp and two lock links and a chain cut in proper length depending upon the size of the wheel.—Rowe Co., Plantsville, Conn.

Standley

Individual cross chains for truck tires designed to be put on in short time and without jacking up the wheel are the Standley chains. These are made of separate units of twist-link cross chain, anchors for attaching the inside of the cross chain to the wheel and adjustable steel rings concentric with the rim for holding the outside ends of the cross chains loosely. The anchors are placed permanently on the felloe with lag screws. The cross chains are put on separately extended in position across the tire and strung on the ring. When all the chains are thus placed, the ring is connected by a turn-buckle. Cross chains are carried loose so that they will have freedom to play back and forth and thus distribute the wear about the tire. The fact that the cross chains are held on one side only makes the chains take a diagonal position which reduces the side slip.—Standley Skid Chain Co., Boone, Iowa.

Giant Grip

Another type of single cross chain for truck tires is the Giant Grip, which consists of a series of cross chains with one unit for each alternate spoke. Each unit is composed of a clamp, two eye bolts and two T-shaped hook links to which are attached a cross chain which goes around tire and felloe. The clamps can be left permanently attached to the spoke and the eye bolts serve two purposes—to bolt the two clamp members to the spoke and also to receive the hook links to which the chain is connected. The chain is attached to the hook link by passing a link over the T-shaped end and around to the end having a round knob. The chain has a special twist in the links so that it will lie flat on the tire. No tools are required and the chains can be taken on or off without the use of jacks in 2 min.—Challenor Co., Oshkosh, Wis.

Windshield Cleaners

Presto-Cloth

Presto-Cloth is a chemically prepared cloth, which with one application over the wet windshield causes the rain or snow to run off, giving the driver a clear vision. One application will last 24 to 48 hr. The device contains no oil or grease and is non-smearing on the windshield.—R. J. Atherley, New York.

Tri-Co

Tri-Co is a rain rubber to clear the windshield. It slides in a slot and clears the entire windshield, top and bottom, all the way across. Spring pressure holds the device, which slides without effort but will not rattle, it is claimed. Multiple gum

rubber makes the cleaner flexible, with two cleaning surfaces on each arm, to remove rain or snow and wipe dry. The rivet heads are of celluloid and do not scratch the glass.—Tri-Continental Corp., Buffalo, N. Y.

Stadco

The Stadco See-Safe windshield wiper has been simplified in design until it can be sold at the small cost of 50 cents. The device operates in either of two ways. It can clean the whole windshield by sliding across the entire length or clean one spot by pivoting in a stationary position. Installation is made without change in the windshield, as a rubber roller snaps over the top and holds the cleaner in place.—Stadeker Metal Specialty Co., Chicago.

Outlook

The Outlook cleaner is adaptable to closed or open cars. It has an adjustable wiper, and a rubber wheel gives tension and will not mar the glass. Two types are offered, one for attachment through the glass and one which fastens through the windshield frame. The rubber roller is on the side opposite from the squeegee strip and holds it tightly in contact with the glass, while permitting it to be moved. Each type sells for $1.50.—Outlook Co., Cleveland, Ohio.

J. T.

The J. T. windshield cleaner is made in three types, for attachment through the glass, attachment through the frame and clamping to the frame. It consists of a squeegee held in contact with the glass and moved by an arm on the driver's side of the windshield. Attachment takes about 15 min. The first two types are $2, and the other $1.50.—J. T. Auto Devices Co., Cleveland, Ohio.

Centrifugal

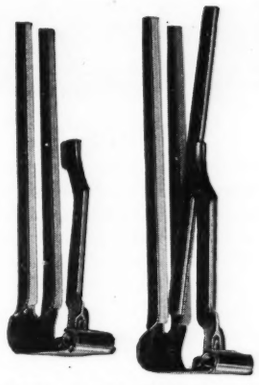
The Centrifugal windshield cleaner consists of a circle of glass fitted into a circular hole in the windshield and revolving at 1800 r. p. m. or more, the centrifugal force keeping the glass clear of any rain, snow or dirt that might collect. Power is derived from a tiny cylindrical motor 1 in. in diameter by 1½ in. in length. The motor is driven from the electrical system of the car or by dry cells, the wires being connected with the motor through the horizontal bar. Operation requires about 6 volts. Price, $20.—Automobile Devices Co., Philadelphia, Pa.

Gabriel

The Gabriel windshield cleaner is attached to the top of the frame in a fixed position and held horizontal by a coiled spring. It is actuated by a cord attached to its free end, passing around the edge of the shield, and fastening to the top of the frame. A pull of the cord clears a center circle of space in the glass and the spring returns the cleaner to its original position. Wood and metal frames are fitted. Price, $2.—Gabriel Mfg. Co., Cleveland, Ohio.

Auto-Scope

The Auto-Scope windshield cleaner cleans both front and back of the windshield. The rear wiping member is of absorbent felt heavy enough to absorb moisture on foggy, misty days but not heavy enough to cause the device to drag. The front wiping member is of rubber which does not become



Autoscope windshield cleaner

spongy, lose its efficiency or scratch the glass, it is claimed. The device can be inserted and used through the opening between the halves of the windshield. Three models are made. Prices, $1 to $2.50.—White Lock Co., Chicago.

Marvel

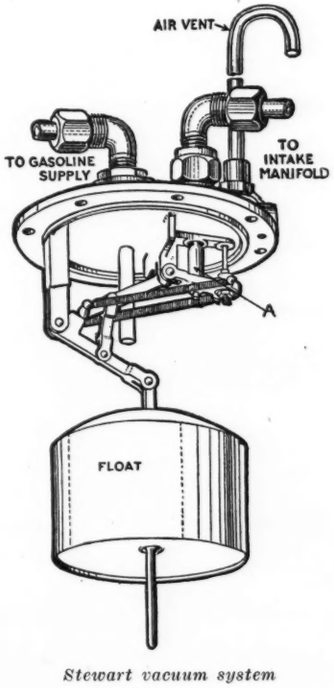
The Marvel windshield cleaner is a simple device which cleans the entire length of the shield with one movement of the hand, giving an unobstructed view to both driver and passenger. Fiber roller bearings are so placed as to prevent any tendency to stick or bind. Price, $1.50.—Marvel Accessories Mfg. Co., Cleveland, Ohio.

Ever-Good

The Ever-Good windshield cleaner has been on the market eight years, having long since proved its worth. It travels along the top of the windshield so the rubber blade has the entire surface of the upper glass panel in its sweep. The device clamps on the frame and need not be removed in good weather, as it is inconspicuous. Prices, $2 to $3.—Emil Grossman Mfg. Co., Brooklyn, N. Y.

Klear-Sight

The Klear-Sight windshield device is made of tempered cold-drawn steel and



Stewart vacuum system

equipped with an insert strip of pure wearproof rubber. The cleaner is applicable to any part of the windshield, on either side through its construction which permits its application either above or below the center of the shield.—U-Auto-C Corp., New York.

Vacuum Systems

Stewart

The Stewart consists of a cylindrical tank divided into an upper and a lower compartment, the former being connected to the intake manifold of the engine and also to the main gasoline line. During the induction strokes of the engine a vacuum is created in the upper compartment of the tank, drawing gasoline into it. After filling, this compartment is opened up to the atmosphere, which permits the fuel to drain into the lower compartment and from there into the carbureter. Thus the process of filling and emptying the upper compartment continues while the engine is running, assuring a constant supply of gasoline for the carbureter. The price is $10. Stewart-Warner Corp., Chicago.

Heco

The Heco tank has an upper and a lower chamber, the upper being the operating chamber, and is attached to the intake manifold from which it derives the vacuum during the intake stroke of the engine. There is but one valve, which is located between the compartments. This valve is closed when the float is down, allowing the upper chamber to fill from the gasoline tank, and the valve opens when the float rises, permitting the fuel to flow into the lower tank and thus to the carbureter. This cycle of events is continuous, maintaining a constant supply of gasoline for the carbureter. Heinze Electric Co., Lowell, Mass.

Sparton

The Sparton cylindrical tank is divided into two chambers by a plate in the center provided with a gate valve which permits the gasoline to flow into the lower chamber when the upper chamber is full. The upper chamber is connected to both the fuel tank and the intake manifold of the engine. Due to the vacuum created by the engine in the upper chamber of the tank the gasoline is drawn from the fuel tank until the upper chamber is full, and then as the float in the upper chamber rises it opens a valve and permits the atmospheric pressure to enter the upper chamber, causing the fuel to gravitate into the lower chamber and from there to the carbureter. This process is continuous, always assuring a plentiful supply of gasoline for the carbureter. Sparks-Withington Co., Jackson, Mich.

Presto-Cloth windshield cleaner

Cox diamond rail bumper reinforced with a central metal strip

enamel parts are polished and given two coats of high-grade baked enamel. Each nickel surface is polished thoroughly and heavily copper-plated before nickeling. This process is said to make the devices well protected from rust. American Brass Foundry Co., Milwaukee, Wis.

U. S. E. Buffer

The U. S. E. Buffer directs the strain of collision away from the front goose-neck of the frame or front spring bolts and is furnished for both front and rear of the car. Attachment can be made in a few minutes, with a monkey wrench. The bumpers are furnished in nickel or black channel as desired, with black-enamel springs and brackets. Price, complete, $15. Universal Shock Eliminator, Inc., New York.

Gemco

The latest Gemco bumper is known as the Hook-on. It is intended for cars that have a splash pan extending to the very end of the chassis frame. This is designed for cars that do not have room for the one yoke that holds the other Gemco bumper brackets without punching the mud pan. The Gemco splash-pan bumper is designed for most of the cars with the splash-pan, but when the hook bolts cannot be used the Hook-on bumper must be used. Other new bumpers in this line are the Cadillac rear, the Overland Country-Club roadster, the Franklin rear, the Gemco light truck bumper, the extensible rear, the rear frame for cantilever springs, the Hudson rear bumper with tire carrier and the rear bumper with tire carrier for the Ford sedan. Gemco Mfg. Co., Milwaukee, Wis.

Piston Rings

Leak-Proof

The Leak-Proof is a concentric, compound ring consisting of two concentric sections or halves of angle iron. Each section seals the opening in the opposing member so leakage of gas is impossible. The sections are so constructed that the pressure on the cylinder walls is uniform at all points in the circumference. The Superoyl has been added recently. This is designed for the correction of oil troubles exclusively. It is for installation in the top groove of each piston and is a concentric ring with an oil reservoir cut into it at an angle of 45 deg. from the intersection of the cylinder wall and the lower groove bearing face of the ring, providing a scraping edge. McQuay-Norris Mfg. Co., St. Louis, Mo.

Burd

The Burd is a one-piece concentric ring with the opening between the ends sealed with a coupling or metallic guard. This coupling rests on two shoulders formed on the ring ends and is held firmly against the cylinder walls. Rings are made of fine gray iron, ground. Prices, 2½-in. and under, $1; up to 3½-in., $1.25; up to 4½-in., $1.50; up to 5½-in., $1.75; up to 6½-in., $2; up to 7½-in., $7.25. Burd High Compression Ring Co., Rockford, Ill.

Micro

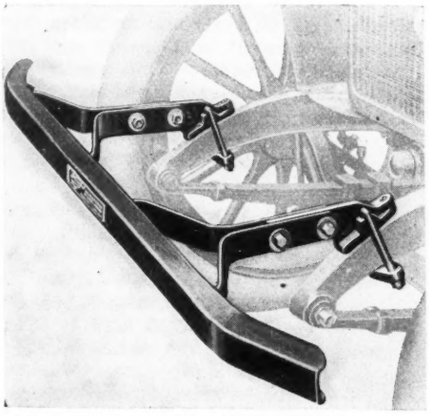
The Micro is a compound concentric ring in which a single concentric ring carries a smaller concentric ring in a channel on its outer surface. The rings are so placed that the joints are diametrically opposite, each sealing the opening in the other. Castings are fine gray iron, individually cast and ground to final shape. Micro Piston Ring Co., 1960 Broadway, New York.

Gill

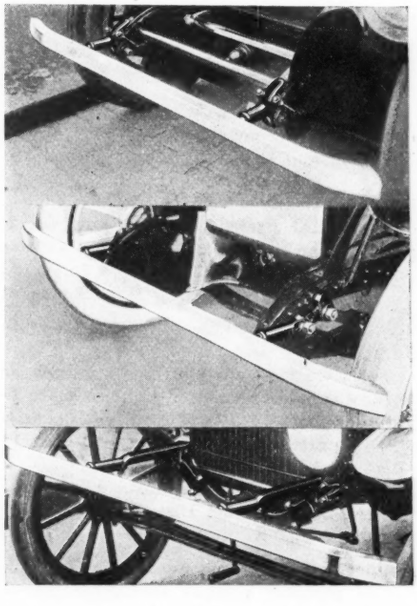
The Gill is a one-piece concentric ring with an interlocking lap joint. The joint is self-sealing and the rings are single-piece castings with special gray iron, machined and ground. It is said the rings adjust themselves to oversize or worn cylinders within reasonable limit. Little or no fitting is required. Price, up to 4-in., $1; up to 5-in., $1.25. Gill Mfg. Co., Chicago.

Pressure-Proof

The Pressure-Proof is a compound ring consisting of three parts, an outer part which comes in contact with the cylinder wall, a smaller ring which closes the gap in the other and an expander which serves to maintain the contact of the ring equally all around the cylinder. It is said the ring adjusts itself automatically to the ring groove. Price, $1.08, 2½ to 3 in.; $1.13, 3⅛; $1.17, 3¼; $1.22, 3⅜, up to $2.16 for 6-in. Pressure-Proof Piston Ring Co., Boston, Mass.



Stewart-Warner Autoguard bumper



Redesigned Ever-Good bumpers

Sealtite

The Sealtite is a one-piece concentric ring in which a butt joint is sealed by a groove and tenon arrangement. They are made in all regular as well as over-sizes. The material is fine grained, gray iron. Prices are 2½ to 3⅞ in., 75 cents; 4 to 4⅞ in., $1; 5 to 5⅞, $1.25; 6 to 6⅞ in., $1.50; 7 to 7½, $1.75. Sealtite Piston Ring Co., Minneapolis, Minn.

Vapor-Tite

The Vapor-Tite is a two-piece concentric ring with joints diametrically opposite and, therefore, sealed. The outer ring has a step joint and the inner ring has a joint split on a radius so that the two lips will fit each other regardless of where. Only the outer ring comes in contact with the cylinder. All sizes are made, prices varying from $1 for 2⅞ to 4 in. to $2.50 for 7 in. size. Baker Valve Co., Minneapolis, Minn.

Victor

The Victor is a two-piece concentric ring with both joints diametricaly opposite and, therefore, sealed. Each section is concentric with tapering sides to provide for even expansion. The heavy portion of one section is opposite that of the other section, also tending to equalize pressure. The expansion slot in each section is protected by the heavy portion of the other. Rings are made of individual castings with the original scale left on the inside to give resiliency. Prices are $1 and $1.25 according to size. A. E. White Machine Works, Eau Claire, Wis.

Inland

The Inland is a one-piece concentric ring with a spiral cut to allow for expansion and provide equal pressure around the circumference of the ring. All sizes are made from 2½ to 7½ in. diameter, the prices being $1 to $1.50 each. Inland Machine Works, St. Louis, Mo.

M-P

The M-P is a one-piece concentric ring made of selected gray iron and having a combination lap and groove and tenon joint. Prices are $1 to $1.50, the latter applying to the 5½ in. size. Metal Products Co., St. Louis, Mo.

Chopa

The Chopa is a compound gray iron ring composed of overlapping sections. Because of the compound construction, an even pressure is exerted on the cylinder walls. It is stated the ring will accommodate itself to turn to worn or scored cylinders within reason. Chopa Piston Ring Co., Detroit.

No-Leak-O

The No-Leak-O is a one-piece concentric ring with a step joint and an oil sealing groove machined around its circumference. The purpose of the groove is to build a small quantity of lubricating oil and ef-

MISCELLANEOUS

Bumpers

Hartford

The Hartford bumper parries blows by flexing before them and absorbs the bump with its double-leaf spring construction. It is an all-steel flexible car guard, strongly and substantially built of high-grade tempered spring steel. The two bump-absorbing loop springs on each side reduce the shock of any collision, and there is a recoil of 6 or 8 in. The bumper is adjustable to different widths of frame by a special clip which supports the leaves in the center. A universal bracket makes drilling unnecessary. A new Hartford bumper attachment for Ford cars permits the attachment of the bumper to the sides of the frame instead of to the front. Each attachment consists of an iron angle bolted to the frame by bolts already in position and, in addition, fastens by a U-bolt over the lamp bracket.—Edward V. Hartford, Inc., Jersey City, N. J.

Stewart

The Stewart Autoguard is composed of five prime parts—the bar, two springs, and two heads or frame connections. A full elliptic spring is used for the shock-absorbing member. Adjustment for different widths of frame is made by a T-bolt and clamp. The bar is manufactured from high-carbon steel, heat-treated for the greatest rigidity and elastic limit. The springs are of finest high-carbon spring steel. Universal adjustable brackets fit any make of car and permit adjustment of the distance between the bumper and the wheels. A special model is made for Ford cars. Prices, west of Rocky Mountains, $9.75; Ford model, $7.50.—Stewart-Warner Speedometer Corp., Chicago.

Halladay

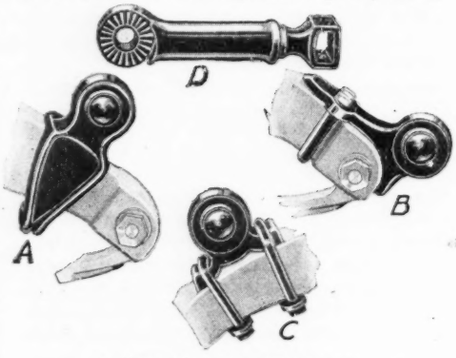
The Halladay bumper is a spring steel bumper reinforced at each end with coil springs designed to absorb the shock if the bumper hits an object at an acute angle. The improved universal type has a U-bar, and recoil is provided by the coil spring construction within the brackets which lead to the frame. A rocker plate enables the brackets to conform with frame extension. One type is designed for cars with open channel frame ends. Diamond channel, round and spring bars are provided. The newest addition to the line is a multiple-spring bar, which is supplied with special fittings. The line as a whole provides for all cars with front frame extensions and for the rear of practically all cars with rear extensions of three-quarter elliptic springs. The multiple-spring bar combines a resilient spring bar, two heavy spiral buffer springs and two spring support bars.—L. P. Halladay Co., Streator, Ill.

Grossman

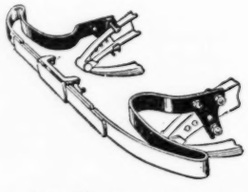
The Grossman bumper is called the Ever-Good and is made in several styles, the Fitsall double-spring, the splash-pan channel, the Packard double-spring, the Ford double-spring and the Saxon channel bumper. The Lohmannizing process makes the nickel finish permanent and is guaranteed rustproof. The bumpers will stand great pressure and return to their normal shape. New brackets and other changes have been introduced into the line. The brackets are now tubular in shape. Special types and rear bumpers for practically all makes of cars are made. Emil Grossman Mfg. Corp., Brooklyn, N. Y.

Cox

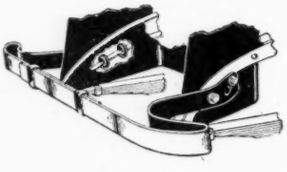
A feature of the Cox line of bumpers for 1918 will be a reinforced non-collapsible diamond rail, in which the reinforcement is inserted, so that the rail is reinforced the entire length except 2 in. on each end, to allow space for the special cap expander.

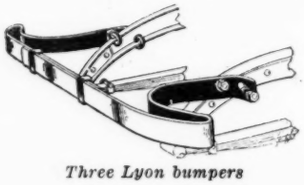


Halladay bumper attachments



Two Hartford bumpers





Three Lyon bumpers

The reinforcement is bent around the curves and the weight is not increased very much. Three sizes in this are offered, 1¼, 1½ and 1¾. Another new design is the Adjustrite Bracket, which is designed to meet the demands for a stock bracket which will fit cars equipped with splash-pan or without. The Adjustrite extension bumper is a universal rear bumper which can be adjusted to meet the conditions on cars where the tires, gas tank and fenders extend considerably to the rear. The arm has 7 in. of adjustment and meets the requirements of many cars which heretofore could not be equipped with rear bumpers. As a whole, the Cox line is complete as regards fitting different makes of cars. Cox Brass Mfg. Co., Albany, N. Y.

Sager

The Sager line of bumpers for 1918 is composed of nearly all new ones, redesigned to fit the new cars. One such is the Perfection bumper, furnished in diamond, duplex and channel, which fits practically every car, regardless of whether it has the inside splash pan or not. Rear bumpers are furnished for all cars. Attachment can be made in 10 min., it is claimed, without cutting or removing either splasher or fender or disturbing any parts at the front of the car. Other Sager bumpers are the Universal, Simplex and the Fit-all, with types for special cars. J. H. Sager Co., Rochester, N. Y.

Oro

The Formost bumper has been added to the line called the Oro. This bumper has a universal fitting, and it is claimed it will fit 95 per cent of all cars. It is adapted specially to all recent models of cars, having the mud apron and fenders that extend all the way to the front tips of the chassis frame, width and curve of frame being taken care of with a special adjustment. Application takes only a few minutes and the wrench does the work. The brackets are of malleable iron, the spring is concealed in housing, and all are furnished in baked black enamel. The bars are finished in black and nickel, rust-proof treated. Drop-forged hook bolts are furnished for attachment. Au-To Compressor Co., Wilmington, Ohio.

Lyon

The Lyon is a resilient spring bumper, made up of two parts of leaf spring construction. The front cross leaves are fastened together by clips, so that they are adjustable for any width of frame. The springs are connected to the frame rigidly without drilling and form a double reinforced front which gives the adjustment for the frame. Application can be made in 15 min., it is said. Special types are made in addition to equipment for medium and large-sized cars. Prices range from $7.50 to $12. Metal Stamping Co., Long Island City, N. Y.

American

American bumpers are of the spring-leaf type, the diamond type and the channel type. Every plunger and spring channel is machined to fit, eliminating rattling. All

lock the Yale key is removed. The steering wheel then spins. To unlock the key is inserted. Price, $7.50. U. S. Auto Lock Co., Chicago.

Defender

The Defender lock is made of cast aluminum and two cylinders are used, one for locking the casing to the Ford switch block and the other for operating the switch. The locking band locks the lid of the coil box, preventing removal of the coil units. For installation the Ford face plate is removed from the switch block and the intercepting switch blade inserted into the slots of the Ford keyway. Price, $3.50. Defender Auto Lock Co., Detroit.

Goodrich

The Goodrich is a steering column lock. A turn of the Yale key locks the steering column, and the front wheels are held rigid. The car can be pushed a short distance forward or backward, but cannot be towed or driven away. A patent clamping feature makes the lock an integral part of the column. Finish is black enamel. When not in use the connecting arm and lock can be removed if desired and dropped in a coat or car pocket. Prices, Ford cars, $7.25; all others, $9.25. Goodrich-Lenhart Mfg. Co., Hamburg, Pa.

H-R Neutralock

The H-R Neutralock automatically locks the gearshift lever in neutral by pressure of hand or foot. Prices for H-type transmission, $6.50; ball and special type transmissions, $7.50. H-R Mfg. Co., Chicago.

Johnson

The Johnson is a gearset lock. The construction permits its application to all makes of cars using a ball control lever. To lock, the key is removed. This automatically drops a plug in the gearshifting arms, making it impossible to shift into any gear even with the engine left running. Johnson Automobile Lock Co., Chicago.

Nulock

The Nulock disconnects the steering wheel from the steering gear and is fitted with a Yale lock. When installed the car can be pushed a few feet to comply with police and fire regulations, but cannot be towed. The device is attached to the steering column and detracts in no way from the appearance, being very small and compact. Price, $14.50. Nugo Device Corp., Lyndhurst, N. J.

Masterlock

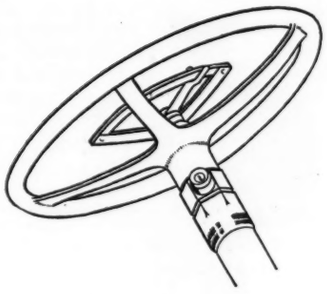
The Masterlock operates by combination consisting of four buttons which alone, among ten evident buttons, give the desired operation of the car. The lock is a permutation switch operating on the electric current. It is set in the dash or in any convenient place. No electrical circuit can be established from the battery or magneto to the spark plugs except when the right combination of buttons is used. Mastertool Co., Chicago.

Thiefoil

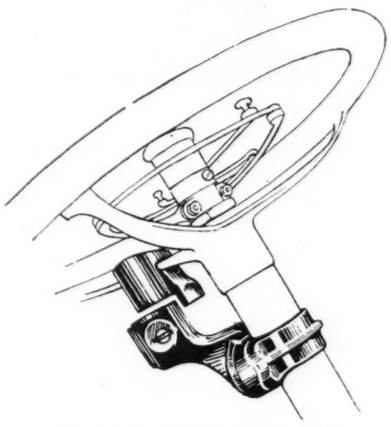
The Thiefoil is an ignition lock installation of which can be made in 2 min., it is claimed. No change in the wiring is necessary. Price, $3.50. Caskey-Dupree Mfg. Co., Marietta, Ohio.

Sandell

The Sandell lock is a switch device permanently attached in a few minutes by removing a screw and then replacing it with the lock in place. The lock resembles an ordinary lock such as is used for a padlock and lists at 75 cents. Sandell Switch Lock Co., Hartford, Conn.



Nulock device for steering column



Goodrich steering column lock

Benefield

The benefield is a combination lock that operates on the dial plan. In effect it cuts off the gasoline supply between the carbureter and the manifold couplings. The dial is on the dash, and steel rods connect it with the lock. Tumblers make it impossible to open the valve by cutting the rods or removing the dial. Security Automobile Lock Co., Indianapolis, Ind.

Marvel Ignition Lock

The Marvel ignition lock for Ford cars replaces the standard Ford plate and ignition key. The same screw that holds the Ford plate in position is used in attaching the Marvel, and when the ignition is shut off by the Marvel lock a metal plate completely covers the only screw by which the lock can be removed or disconnected. Two keys come with each lock. These keys are not interchangeable with the keys of any other Marvel lock. The device is finished in black enamel. Price, $1.50. Marvel Accessories Mfg. Co., Cleveland, Ohio.

Blacolock

The Blacolock is an ignition lock and is supplied for every type of ignition. One type controls both lights and ignition. A Yale key operates the device. Blackburn Specialty Co., Cleveland, Ohio.

Jacks

Kimball

The features of the Kimball ball-bearing jack are its long handle and easy method of operation. Ball-bearings carry the lift and thrust, reducing friction. The top is made of hardened steel with a diamond-pointed surface, which prevents the jack from slipping. It is furnished in three sizes. The No. 1 has a minimum height of 9 in. and an extended height of 15 in. Number 3 is furnished with a minimum height of 11 in. and maximum of 18 in., while No. 4 has a minimum height of 12 and maximum extension to 20 in. The heavy-duty type Kimball jack is not only adaptable to truck and motor car use but can be used as an all-around jack in machine shops. This jack has a 45-in. handle. Prices $4.50, $5 and $5.50 respectively for No. 1, 2 and 3; heavy-duty $15. F. W. Mann, Milford, Conn.

Buffington

The Buffington is a tire-saving jack. It is made of ½-in. round stock and has a foot 5 by 8 in. The finish is black enamel, and the part that comes in contact with the car is wood provided with holes to raise and lower the block to accommodate different height wheels. Four jacks comprise a set. C. A. Buffington & Co., Berkshire, N. Y.

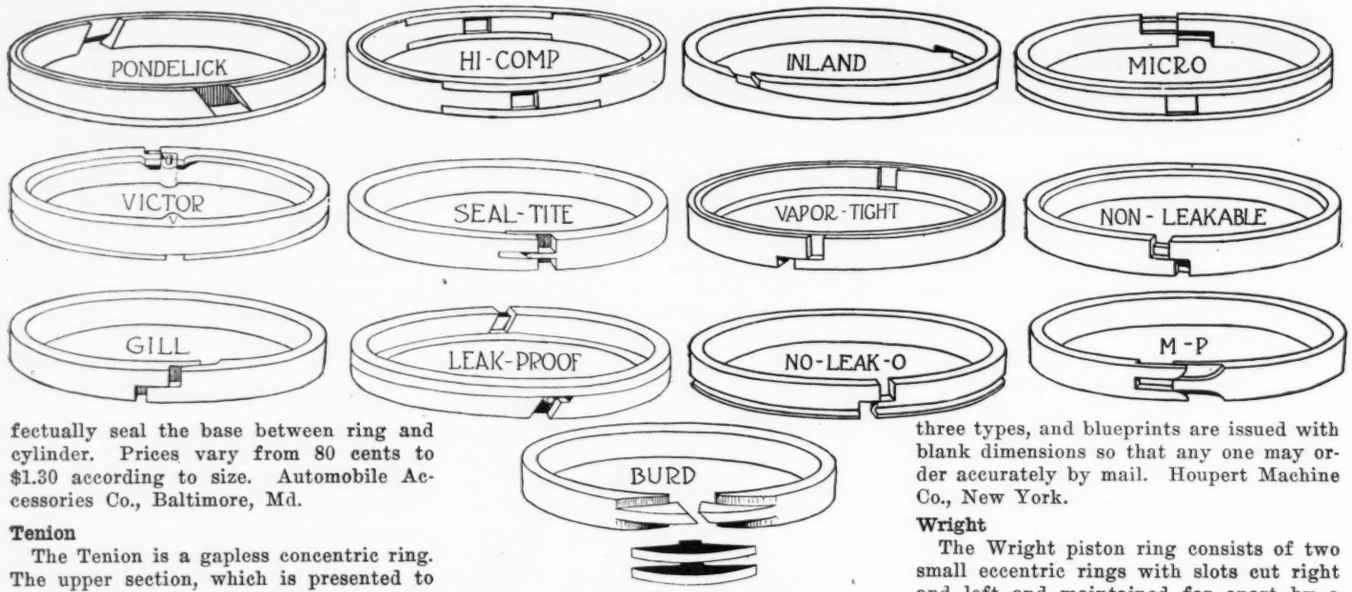
Hartford

The Hartford jack consists of a set of ingeniously arranged gears which convert the easy strokes of the handle into powerful lifting effort. These gears are of steel accurately machined. A tough malleable-iron case houses them. A long handle takes the operator's hand clear of contact with car or ground as well as facilitating the placing or removal of the jack. The Hartford jack comes in black enamel with gold striping. Price, $8. Edward V. Hartford Co., Inc., Jersey City, N. J.

Rees

The Rees jack has a worm-gear drive and obviates getting under the car to place the jack in position. The long handle

Weaver jack for use in garages



Some of the piston rings

fectually seal the base between ring and cylinder. Prices vary from 80 cents to $1.30 according to size. Automobile Accessories Co., Baltimore, Md.

Tenion

The Tenion is a gapless concentric ring. The upper section, which is presented to the pressure of explosion and expansion, is an inverted L shape. The lower section is rectangular and interlocks with the upper section. The joint in the upper section is sealed by the lower section and vice versa. The circumferential joints are on the lower and outer surfaces where they collect oil, thus being properly lubricated; the oil also operates as an effectual seal. Prices are $1.60 for 2¾ to 4½ in. size; $1.75 for 4⅝ to 4⅞ in. and $2 for 5 to 5½ in. Edward A. Cassidy Co., New York.

Wasson

The Wasson ring is a one-piece concentric ring with an ordinary joint. The inner surface of the ring is peened by a special process which results in equal expansion at all points in the circumference. The ring is made from pot castings of gray iron, machined and ground. Lake Sales Co., New York.

V-Plex

The V-Plex is a compound concentric ring in which a V-section ring fits into a V groove in another section. Ordinary joints are sealed by the V section and in case of wear this V section merely fits more tightly into the V groove. Prices up to 2½ in., $1; 2½ to 3¾, $1.25; 3 3/16 to 4½, $1.50; 4 9/16 to 5½, $1.75; 5 9/16 to 6½, $2. Tri-Plex Sales Co., Chicago.

Ever-Tight

The Ever-Tight is a three-piece piston ring consisting of three concentric pieces which fit together at right angles, making a right-angle interlock. The rings are fitted relatively to each other so that no opening is left. Ever-Tight Piston Ring Co., St. Louis, Mo.

Munger

The Munger Always-Tight piston ring is one-piece and concentric, the joint being made by a double cut that gives a close seat at an angle with the face of the ring. The surface of the ring that comes in contact with the cylinder wall is not polished but is finished with minute grooves to insure a perfect seat, any loss in the diameter of the ring due to wear being taken up automatically by the expansion joint. These rings are made for all sizes of cylinders. A special Ford assortment consists of eight regular and four over-size rings with grooving tool and insertion tool. Splitdorf Electrical Co., Newark, N. J.

A. C. Non-Leakable

The A. C. Non-Leakable ring consists of two elements, an outer and an inner ring. The outer element is L-shaped and the inner element is square. Only one section of the ring presses against the cylinder wall. Prices, $1, 2⅝ to 4⅞ in.; $1.25, 5 to 6 in. A. C. Non-Leakable Piston Ring Co., Compton, Ill.

Pondelick

The Pondelick is a two-piece concentric ring with taper-seated self-adjusting and corrugated interlocking surfaces. Rings are made in all sizes; price, $1, 2½ to 3 7/16 in.; $1.25, 3½ to 4½ in.; $1.50, 4 9/16 to 5½ in.; $1.75, 5 9/16 to 6 in. Pondelick Piston Ring Co., Chicago.

Hi-Comp

The Hi-Comp piston ring consists of two eccentric rings that are assembled into a perfect concentric ring. The pieces are so fitted that each eccentric ring seals the opening in the other. The ring is listed at $1.50. Continental Piston Ring Co., Memphis, Tenn.

Sta-Tite

The Sta-Tite is a three-piece compound concentric ring consisting of three units, a bull ring and two outer rings, pinned relatively to each other so that no opening is left. Slots are set on thirds and the circumferential pressure is the same at all points. The rings are furnished in all sizes and widths. Price, $1, 2½ to 4 in.; $1.25, 4⅛ to 5 in. Piston Ring Co., Muskegon, Mich.

Jointless

The Jointless is a piston ring which has no dowel pins or exposed ends to score the cylinder walls. The ring itself consists of two parts which join together with the openings 180 deg. apart and concealed by the manner in which it joins the other half of the ring.—Detroit Piston Ring Co., Detroit.

Houpert

The Houpert pistons are made for all cars in both standard and S. A. E. oversizes. Pistons are classed according to three types, and blueprints are issued with blank dimensions so that any one may order accurately by mail. Houpert Machine Co., New York.

Wright

The Wright piston ring consists of two small eccentric rings with slots cut right and left and maintained far apart by a dowel pin so that each ring seals the slot in the companion ring, thus holding compression and preventing the passage of oil into the combustion space. V. A. Longaker Co., Indianapolis, Ind.

Locks

Reliance

The Reliance safeguard lock is of bronze casting with a locking mechanism of finest steel to obtain sturdy construction. The steering wheel spins when locked. Price, $5. Reliance Co., Chicago.

Moss

Every Moss combination lock has its own combination, of which there are no duplicates. The combination takes the place of a key, and the owner can change the combination when so desired. Price, $5. Moss Auto Combination Lock Co., Chicago.

Security

The Security lock is made of highly-nickeled, strong and heavy brass and is equipped with a non-pickable lock with two keys. It is attached under the steering wheel can be installed in 10 min., it is said. No filing or drilling is necessary. The lock screws on. When locked the steering wheel spins. Price, $5. Security Auto Lock Co., Chicago.

Elka

The Elka is a switch lock with a self-locking feature which operates without a key by turning the lever to neutral. To unlock the key is inserted and the lever moved to magneto. The device is fitted with Yale pattern, four-pin tumbler lock, face plate black-enameled, lock and lever nickel plated. Price, $3. Elka Mfg. Co., San Francisco, Cal.

Perry

The Perry lock temporarily disconnects the steering wheel from the steering column when the car is idle. There is a comparatively new model which locks the tire carrier. This is built into the carrier and may be purchased with a key that fits the lock on it and on the steering wheel. Perry Auto Lock Co., Chicago.

U. S.

The U. S. safety lock fits into one of the steering wheel rods and presents little change in the appearance of the wheel. To

makes the operation easy and is attached to the jack by a universal joint which permits the operator to stand tangent to the jack in case unevenness of the ground makes this desirable. It lifts steadily and noiselessly and lowers in the same way. There are no springs, pawls or ratchets. There are two sizes, the 2-ton size for motor cars and the 5-ton for trucks. Prices, $8 and $15 respectively. Service Corp., Pittsburgh, Pa.

Gemco

The Gemco service jack is an all-steel construction except the long wood handle. Steel is used for everything but the supporting arm and wheels, which are made of castings. These jacks are called the One-Stroke jacks inasmuch as but one movement of the lever is required to lift the car. It requires but 2 sec. to raise the car, it is said. The Gemco service jack weighs 32 lb. Price, $15.—Gemco Mfg. Co., Milwaukee, Wis.

Brunk

The Brunk jack is for heavy-duty work. It has a lifting capacity of 5000 lb. and weighs about 100 lb. It can be used for loading and unloading cars for shipment. A car can be shifted in any direction or turned completely around in its own length. It can be raised from 9 to 22 in. The jack is made of malleable iron and steel. The sector arm is engaged on spur gear mounted with a movable shoe, which is kept in a horizontal position by a regulating rod. The frame is mounted on four casters which rest on housed ball bearings yoked on a cone swivel. The handle is in two sections in addition to gear handle. Price, $30.—Brunk Mfg. Co., Marion, Ind.

Cady

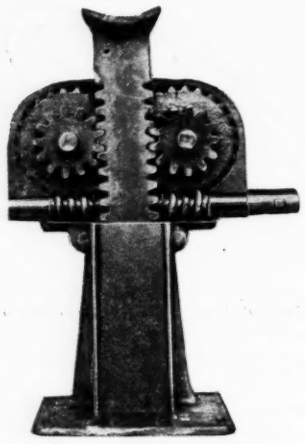
The Cady automatic jack is designed to lift the entire car. The carriage of the jack is adjusted to the height of the front axle of the car and the car is simply run over it. The front axle rests upon the carriage and the momentum of the car carries it up the front incline. As the carriage goes up the front incline the rear of the incline raises the rear of the car, lifting the tires 1½ in. from the floor. To remove the car from the jack requires but a slight movement of a small lever. It is made for all makes of cars, with a special size for Fords.—Cady Patent Appliance Co., Cleveland, Ohio.

Gibralter

The Gibralter jack is of the gear type, operated by a long handle, making it unnecessary for the operator to get under the car. The standard height of the jack is about 12 in., and it can be raised to 18 in. It weighs about 10 lb. and will raise a car weighing 3 tons. Price, $7.50.—Gibralter Jack Co., New York.

Peteler

The stroke of the Peteler is very short and the lifting action quick. It raises ⅜ in. with each stroke of the lever. The jack is so designed that every raise of the lifting bar is immediately caught and held. To lower the load it is only necessary to turn a small handle, which reverses the action and the load comes down quickly, step by step as it went up. When all the load is off the jack a slight lift of the handle allows the lifting bar to drop the remaining distance at once and the jack can



Rees jack

be withdrawn. It is built to lift 3000 lb. The lifting bar is steel, with tool steel pawls. Other parts are of pressed steel. Price, $6.—Coe-Stapley Mfg. Corp., Bridgeport, Conn.

Beard

The Beard tire-saving jack for Ford cars is made entirely of steel and operates on the hub of the wheel. It works by the simple process of pushing down on the lever with the foot. The sliding bar is made double and slips over a standard clip attached to the bottom of the jack frame. Should one downward thrust of the lever not be enough to raise the load, other lifts can be made by simply inserting cotter pins at the bottom end of the sliding bar and again pressing the lever down.—The Beard Auto Lift Co., Pleasant Lake, Ind.

Barret

Barret jacks for passenger car use are provided with a foot lift of the sliding type which may be set instantly at any height on the rack to fit under the car axle. In operating the handle falls, working against a rack which lifts the jack one tooth at each stroke. The up and down movement is controlled by a conveniently located lever. The Barret universal jack is automatically reversible and may be operated with strokes of any length. The ratchet mechanism is of improved design and turns the screw by machine-cut bevel gears. The base and frame are of malleable iron, and all bearing surfaces are machined. The universal model is adapted especially for passenger car work. Price, $7.50.—Duff Mfg. Co., Pittsburgh, Pa.

Four-Wheel

The Four-Wheel jack lifts the entire car. It consists of two lifting units and a chain connection. The frames can be tilted at any angle and a powerful differential jack screw pushes the car forward a few inches, bringing the frames to an upright position and elevating both front and rear end of the car. Adjustments are provided for different wheelbases. The car on entering the garage passes over the device, and it is only necessary to place the frames in position and turn up the jack screws.—Reading Automobile Co., Reading, Pa.

Lane

The Lane jack is made with a pressed steel frame and steel lift bar having accurately machined notches. The lifting lever is made with a broad handle long enough to reach well away from the car or its equipment. The handle is collapsible in the center, so that the whole equipment may be folded into a small unit. Four models are furnished, in capacities from 1800 to 3000 lb. Price, from $1.75 to $3.—Lane Brothers Co., Poughkeepsie, N. Y.

Jiffy

The Jiffy jacks contain only seven moving parts, and all work is done on the down stroke. Seven types of jacks are furnished, from the light passenger car type to heavy-duty jacks for trucks, etc. The one known as the Easy-Lifter model will lift from 10 in. to 15½ in. and has a capacity up to 3000 lb. It weighs 5 lb. The company also makes two types of tire-saving jacks fitted with a base of suitable size so the car will not tip. On the regular types of jacks the handle swings in a short radius making the jack suitable especially for cars with a long overhang.—Jiffy Jack Co., Cleveland, Ohio.

Buckeye

Buckeye jacks come in a variety of sizes. The line of motor truck jacks is especially complete and sizes can be had from those for the lightest delivery vehicle to the largest truck. They are made of malleable iron and heat-treated drop forgings. There is a spacious top on all the jacks designed so that the paint will not be marred on the car. The midget of the line has a capacity of 1000 lb. and weighs about 4 lb. The largest jack is for 5-ton trucks. Between these two sizes are jacks designed to take care of all passenger car work. All are of the ratchet and pawl type.—Buckeye Jack Mfg. Co., Alliance, Ohio.

Reliable

The Reliable jacks are built in both the screw type and ratchet and pawl type. They are made in sizes up to 8 tons capacity. There is also a complete line of tire-saving jacks, all of which are readily adjusted for various heights of wheels, except the 20-Century tire saver, which is a very simple lever and stand. The No. 45 jack is suitable for capacities up to 1½ tons and weighs 8 lb. The adjustment range is from 12 to 20 in. It is known as a single-acting jack and raises on the down stroke only. It can be reversed instantly and lowered automatically. Price, $1.75. Elite Mfg. Co., Ashland, Ohio.

Eureka

The Eureka jacks are made in both the screw and ratchet and pawl types. The line also includes several models of tire-saving jacks. The Eureka No. 1 is designed for cars weighing from 2000 to 3000 lb. It has an adjustment of 10½ to 17 in. and weighs 5 lb. The Eureka King is a combination of both types and suitable for cars up to 2 tons. It has an adjustment of from 9 to 19½ in., weighs 7 lb. and comes with a wood handle. Price from $1 to $5. Ashland Mfg. Co., Ashland, Ohio.

Pratt

Pratt jacks are made in both the screw and ratchet types and include all varieties from a light passenger car jack to the heavy-duty garage type. The ones for passenger cars are made of malleable iron and consists of only six parts. They raise or lower the load one notch at a time on the downward stroke of the handle, a small trigger determining whether the load is to be raised or lowered. The No. 17 jack is

for garages and has a very long handle. The rollers on the base permit it to be slipped under a car without getting under it. The Pratt Three-Wheel garage jack consists of a triangular frame with two screw-type jacks mounted on three steel wheels. This type is made with hinges so it can be folded into a small space. William E. Pratt Mfg. Co., Chicago.

Weaver

The Weaver twin jack is for garages and has three wheels for quick movement. Two jacks are mounted on the steel frame operating on the screw principle. A long handle is provided for manipulating the screws and both are operated in unison. An extension is provided for this jack for cars which have a long rear overhang. The jack puts the car on casters and comes in two sizes. The lighter has a capacity of 4000 lb. and the heavier 8000 lb. Prices, $20 and $36 respectively. Weaver Mfg. Co., Springfield, Ill.

Ekern

Ekern jacks or stands are especially useful in garages and shops where it is difficult to find anything to place under the car to hold it up when work is done on the axles, etc. These stands are made of steel throughout and are light in weight, being only 11 lb. each. They can be adjusted to any height from 20 to 37 in. Price, per set of two stands, $6. Ekern Brothers, Flandreau, S. D.

Norwood

The Norwood jack is a combination instrument consisting of a caster with four buttons on the top of the casters, which are shaped to hold round ends of the base on the jack. The jack is fitted with a long handle. One can use the jack alone or the caster alone or, if desired, both for higher blocking or changing the position of the car. Three sizes are made, for light, medium and heavy cars. Prices from $6 to $12. Automobile & Accessories Mfg. Co., Baltimore, Md.

Simplex

The Simplex is made in a variety of styles and sizes, from passenger car models to heavy garage types. One of the leaders in the line is the No. 45 geared type. This is a powerful jack that operates with little effort, due to the unusual gear construction. It is suitable for passenger cars and trucks up to 3-ton capacity. A readily attached shoe is provided to increase the possible lifting height over 2 in. Templeton Kenly & Co., Ltd., Chicago.

Standard

The Standard DeLuxe and Leader jacks are of the rack and pawl type and of the bevel gear type. They come in various sizes. There is also a tire-saving jack in the line which may be adjusted to any height of axle, and then pressure of the lever lifts the wheel from the ground. In the ratchet and dog types, slipping or dropping is prevented by an automatic lock. National-Standard Co., Niles, Mich.

Badger

The Badger line of jacks includes a full assortment for all kinds of work. The No. 10 screw jack supplies the demand for a device which by the use of a long handle can be set under the axle. This is especially desirable on cars with a long overhang. Because of the long handle these jacks are easy to operate. Ball bearings are fitted, packed in dirt-proof housings. Adjustment for up and down travel is made by a thumbscrew. Walker Mfg. Co., Racine, Wis.

Detroit

The Detroit jack is an all-steel device designed for use as a tire saver or for storing cars. It has a straight lift and locks by passing the center. The lever folds neatly over the base and is out of the way. The leather-faced swivel mounted directly on top adapts it for use in any position either under the axle or hub of the wheel. Price, $6 for set of four. Auto Jack Works, Angola, Ind.

Oliver

The Oliver-Samson jack is for light and heavy service. It raises on the down stroke only and can be operated by hand or foot. It also can be tripped instantly by throwing the handle up, or lowed automatically. The bracket is shaped so it can go between the truss rod and axle on some cars. An iron handle is furnished, but a wood handle can be used, if desired. Three sizes are furnished, for cars of from 3 to 6 tons. Price, $3 to $8. Oliver Mfg. Co., Chicago.

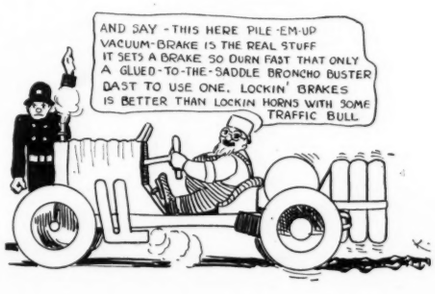
Excel

The Excel jack is for heavy-duty work. It is of the lifting-handle type and has a heavy base fitted with rollers for easy handling. One downward movement of the lever raises the car instantly. There is an easily operated adjustment which fits the jack to fit any part of the frame or chassis. The jack will lift on any car up to 24 in. without blocking. There is also a toe extension provided with a low lift of 4½ in. and a high lift of 15 in. Price, $18. Randall-Faichney Co., Inc., Boston, Mass.

Ellis-Smith

The Ellis-Smith combination jack is so constructed that not only is the front or rear end of a car raised but can be swung around in any direction. The jack has 10-in. wheel, 3-in. threads and is fitted with roller bearings. There is a 5½-ft. curved handle. The screw lift jack is designed to do the same work as the garage jack but is so constructed that it will handle cars having low bumpers or overhanging parts. Ellis-Smith Mfg. Co., Buffalo, N. Y.

Hartford jack


AND SAY - THIS HERE PILE-EM-UP VACUUM-BRAKE IS THE REAL STUFF IT SETS A BRAKE SO DURN FAST THAT ONLY A GLUED-TO-THE-SADDLE BRONCHO BUSTER DAST TO USE ONE. LOCKIN' BRAKES IS BETTER THAN LOCKIN HORNS WITH SOME TRAFFIC BULL.

Weed

The Weed chain jack is operated by giving a few pulls on the chain, with the operator in an upright position. To lower the car the chain is pulled in the oposite direction. It operates on the same principle as a portable hoist. The jack has a strong cap for an axle support, from which the axle will not slip, it is said. A broad base prevents the jack from digging into soft dirt and upsetting. There is an extra head which may be added, giving an increase in height of 2 in. Price, $5. American Chain Co., Bridgeport, Conn.

Acme

The Acme jack is provided with a rigid folding handle having a crank at one end. The handle can be attached and detached readily, so that the jack can be placed under the car without any difficulty. On account of the quick pitch screw the car can be raised easily and rapidly. Price, $6.50. I. S. Spencer's Sons, Inc., Guilford, Conn.

Hovey

The Hovey jack is one adapted for garage use on account of its construction and the rapidity with which a car can be raised. It consists of a long handle with an adjustable head and the car is raised by placing the jack under the car and depressing the handle. The entire jack is mounted on two steel wheels. The jack is made in two sizes, one 48 in. long and the other 60 in. The former sells for $7 and the latter for $10. J. H. Whetstone & Co., Lapeer, Mich.

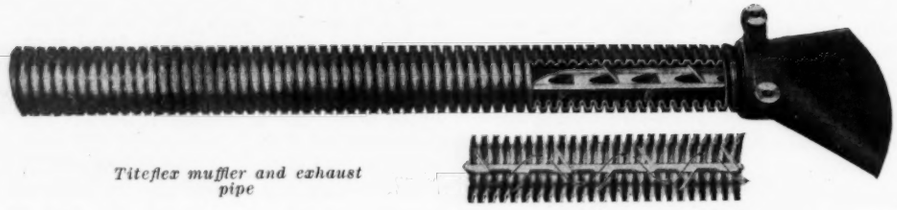
Mufflers

Vacuum

It is claimed for the Vacuum muffler that it will reduce the back pressure even below that obtained with an open valve exhaust pipe. The device is small and light and rattle free, since it is made of cast iron. Open passages prevent the collection of carbon. The gas from the engine enters the muffler through the center and expands as it moves out through the wedge-shaped passages through the discharge opening on the circumference. Each discharge of gas is broken up into twenty-four puffs by the twenty-four passages. These puffs do not reach the opening at the same time but one after the other, so the noise of the explosion is broken entirely. This is due to the length of the path from each passage way to the discharge opening of the muffler, which is different. Price, Ford size, $3; others up to $6.—Vacuum Muffler Corp., New York.

Maxim

The Maxim muffler is based on the same principle as the gun silencer. The exhaust products enter the central chamber at one end and pass into the surrounding chamber through a slip 3/16 in. wide, extending the entire length of the muffler. The gas passes from the intermediate chamber to the outer chamber in the same way but with an opposite direction of motion. From



Titeflex muffler and exhaust pipe

the outer chamber they pass through large punched holes in the inner head into a chamber at the end of the muffler and then through the central discharge pipe. There are two distinct noises in the discharge, the first, caused by the high-pressure gases issuing past the suddenly-lifted exhaust valve, and the gas puff noise produced as the gas issues from the exhaust pipe into the muffler device. The intensity of the first noise depends upon the number of tubes used in the muffler. To overcome the second noise it is the general custom to obstruct the path of the gas. In the Maxim, instead, the gas is allowed to issue from the central feed through a tangential slot into the next tube, the energy in the gas finally being dissipated by friction walls caused by the hurling gas. Only the gas moving at high speed engenders any friction of considerable amount, so it is claimed that there is less back pressure in this muffler than in one that uses perforated tubes or baffle plates. Every compartment is tubular.—Geuder, Paeschke & Frey, Milwaukee, Wis.

Titeflex

The Titeflex muffler and exhaust pipe is a metal tube with helical corrugations connected directly to the exhaust manifold. The corrugations cause the exhaust gases to be deflected and thus acts as a brake to their velocity. The gases are further deadened by a deflector strip at the rear end which has vanes cut in it so that the gases are deflected first one way and then the other. This continuous zigzag path breaks up the stream of gases which are finally exhausted through a fin shaped tail piece. Titeflex Metal Hose Corp., New York.

Tools

Beach

The Beach automatic grip tool is simple in construction and can be locked in any position. The grip is positive, cannot unhook and adjusts to work instantly. The length of the arms is 12 in. from the bell crank to the hook, and they open to 18 in. Price, $20, east of the Rockies; $25 west of the Rockies.—Lowe Motor Supplies Co., New York.

Imperial

The Imperial angle wrench is designed for use in close quarters at difficult angles, with a good hold and a square pull where an ordinary wrench cannot be used. The handle ratchets either way when a button is pressed. The wrench can be locked in any one of eight different angles.—G. L. Holmes, New York.

Universal

The Universal cylinder-reboring tool is for use on truck, tractor, motor car, stationary, marine and airplane engines. The cutter head has six cutting surfaces that are adjustable in using. A bevel expansion ring is fitted into the cylinder which is to be rebored and a bevel power head acts as a centralizing device. An over-size securing ring follows in the new cut, insuring an absolutely rigid tool and a perfect centering device, it is claimed. Deep scores or connecting rod clearances have no effect on the operation. The new tool is for use either by hand or under a drill press, and on detachable head cylinders reboring can be done without removing the cylinder blocks from the car. A universal adjustment permits the operator to set the cutters at any desired size, within .0005 in., enabling him to rebore the cylinder in one operation to fit pistons already made, regardless of the size of the piston.—Universal Tool Corp., Detroit.

Sterling

The Sterling line consists of valve-reseating machines for repairing valves. Different types, for repairing valves 3½ in. to 6 in. in diameter to those for repairing valves of any size, are offered.—Sterling Valve Reseating Co., Rochester, N. Y.

Walden-Worcester

The Walden-Worcester line of wrenches has been changed somewhat by the combination of former models for Ford cars into new designs having several jaws, making new tools which do the work of more of the previous models.—J. H. Faw Co., New York.

May's

May's cotter pin puller is a device shaped somewhat like a ticket puncher. The action of the handle draws in a heavy steel sliding hook, which is fitted into a lower jaw of the puller. The jerk on the hook, combined with the pulling force of the operator, makes the removal of the cotter pins simple. Brewer-Kitchener Corp., Cortland, N. Y.

Brown

The Brown valve-grinder is a simple device of such size that it can be handled easily. It is so constructed that it can be used singly or in series up to eight at the same time, making it possible to grind the valves of a four- or eight-cylinder car in about the same time it would take to grind one.—W. C. Brown, Niles, Ohio.

Weise

The Weise cam-operated leaf spreader is a simple device for opening up spring leaves to get lubricant under them. It is readily adjustable by a screw shank. The sliding member, which is actuated by the cam lever, is held against the cam lever by a spring tension. To open the spring leaves it is only necessary to adjust the spring so that the points fit loosely against the leaves and move up the cam lever.—A. F. Weise, Chicago.

Heiser

The Heiser improved cylinder-boring machine has a range of adjustment large enough to cut away the entire cylinder wall and can be used to fit a set of over-sized pistons in from 6 to 9 min. When the proper size has been determined, several cylinders can be bored accurately without changing the adjustment. The boring bar is guided with absolute accuracy, it is claimed, by the two pilots, and rebores between centers without the slightest taper. The device is self-centering, weighs 45 lb., and is operated by hand. The cutting bits are sharpened and given the correct amount of clearance without an emery wheel. Price, $38. —Heiser Special Tool Co., Kingston, Mo.

Munger

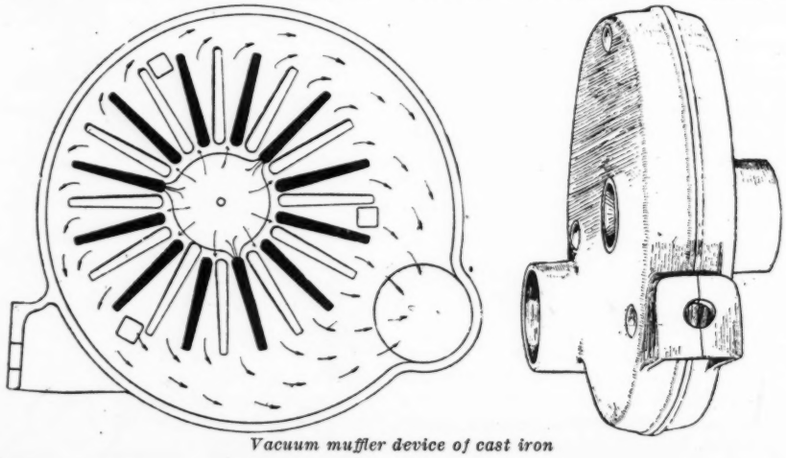
The Munger piston-regrooving tool is provided with an adjustable screw to adapt it to different-sized cylinders. This device is adapted specially for use with the Munger Always-Tight piston ring. With this tool it is unnecessary to disconnect the piston from the connecting rod. It is said that its work is as exact as that of a lathe. —Splitdorf Electric Co., Newark, N. J.

Struve

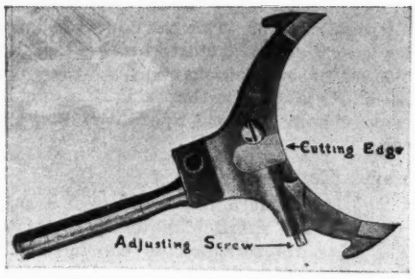
The Struve spring leaf spreader is for the ready lubrication of springs. It is all steel, drop-forged and weighs 2½ lb. The blade is 11 in. long and case-hardened. When adjusted to the width of the spring, a quarter turn of the lever separates the leaves. Price, $2.—H. H. Struve Mfg. Co., Cincinnati, Ohio.

Storm

Tapered centering rings will be used on all of the Storm reboring machines for 1918 to insure correct centering even in the hands of inexperienced users. The six cutters are made of special tooled steel and are ground to exact size. A self-adjusting



Vacuum muffler device of cast iron



Munger piston regrooving tool

lower bearing has been added for support to the head, and with this the lower beveled center surfaces do not rotate upon each other and are protected from wearing or cutting out of true. Sizes for every requirement are offered. Cutter heads are furnished with range of capacity from 2⅝ in. up. A drill press connection also is being put out.—Storm Mfg. Co., Thompson, Iowa.

Knowlson

The Knowlson spring spreader is suitable for spreading the leaves of spring on either passenger cars or trucks for the purpose of lubricating them. The tool is made such that it will fit a spring of 3-in. width. Prices, $1 and $1.50.—Spring Leaf Lubricator Co., Ann Arbor, Mich.

Universal

The Universal bench valve tool is adapted to true up valves that have become warped from excessive heat. It is made to take all diameter of valves with stems of 5/16 and ⅜ in. Two types of cutters are supplied, one for cast-iron valves and the other for high-speed cutting purposes.—Savidge Co., Indianapolis, Ind.

Sioux

The Sioux valve tools are standard tools made for reseating, regrinding and refacing valves. The outfit consists of five reseating cutters and the other equipment necessary for these and for regrinding valves. Price, $22.50.—Albertson & Co., Sioux City, Iowa.

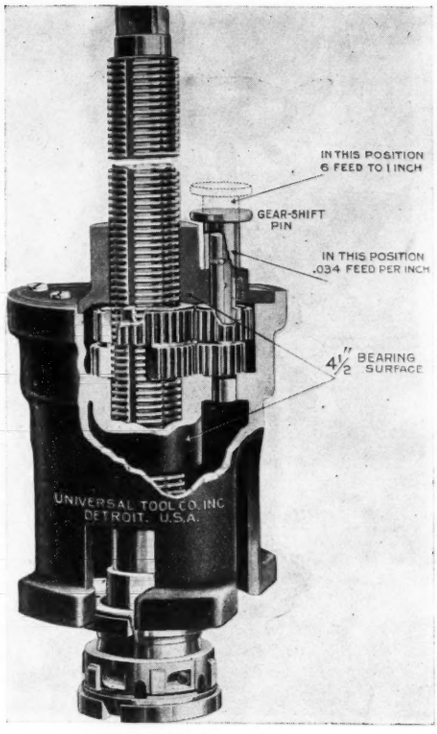
Tomahawk Lubricator

The Tomahawk spring lubricator can be inserted with the pressure of the fingers or a light tap of a hammer if the car is jacked up. It is made of the finest drop-forged steel, hardened and nickel-plated. Any form of grease can be fed from the container in the handle. The Tomahawk graphite spring lubricant comes in tube form, which makes it easy to refill the grease container. Each tube contains enough lubricant for 2000 miles. The illustrations show the method of filling the lubricator. Prices, lubricator, $1.25; lubricant, 50 cents. Charles W. Manzel Co., Buffalo, N. Y.

Sundries

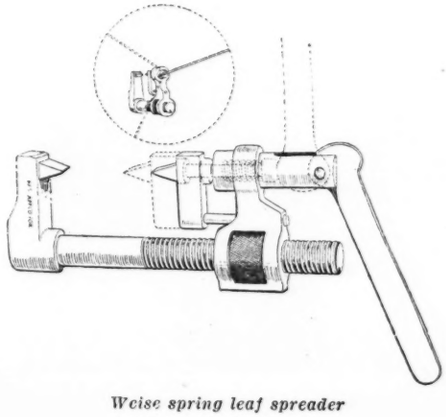
Esta Water Auxiliator

The Esta device is described by the manufacturer as an automatic gas economizer and carbon remover. It is simple in its action depending on its engine vacuum to draw air through the water in the device

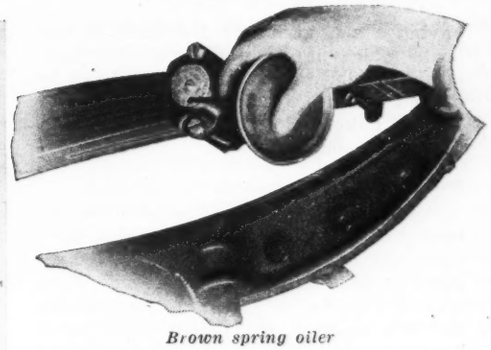


Universal cylinder-reboring tool

Tomahawk lubricator and lubricant



Weise spring leaf spreader



Brown spring oiler

and thus introduce water vapor into the combustion chambers of the engine. By these means it is claimed that practically perfect combustion is secured and that preignition is impossible. Esta Water Auxiliator Co., Inc., New York.

Weaver Auto Oiler

The Weaver oiler combined into one unit the ordinary funnel oil can and oil measure. It also eliminates the usual waste and dirt which accompanies the handling of oil in the customary manner. The flow of oil from the spout of the can is controlled by a thumb button on the handle of the can. It is possible to measure accurately the amount of oil discharged from the can by a dial which can be set manually before each discharge of oil from the can. The can is constructed of heavy galvanized iron and sells for $7. Weaver Mfg. Co., Springfield, Ill.

New York Foot Support

The New York foot support is a device designed to relieve strain of the driver and prevent irregular application of engine power, particularly in driving over rough roads or bumpy streets. The support consists of two members of drawn steel with a rod through both so the top member rocks backward or forward, carrying the weight of the driver's foot and permitting a gradual application of power. A spiral spring keeps the upper member in an upright position. The device can be raised or lowered to suit the height of the accelerator. Price, 75 cents. New York Coil Co., New York.

Rives Pedal Pad

The Rives pedal Neverslip pad is designed for any make of car and is highly resilient and adhesive, preventing harmful pressure on the ball of the foot. The device is a non-conductor of heat and is for both clutch and foot brake pedals. Price, $1 a set. George H. Rives Mfg. Co., Inc., New York.

Keepers Puller

Keepers puller is a mechanical device for extricating mired cars, pulling them out of ditches, etc. It weighs 28 lb. and provides a compound leverage said to give the power of about four horses. It is equipped with 12 ft. of cable and the stakes necessary for an anchorage. J. C. Keepers, Olathe, Kan.

Lakewood Belt Fasteners

Any kind of belts, fabric or leather, can be fastened with the Lakewood belt devices, which consist of two metal portions riveted to the ends of the belt, one portion

having a slot in it and the other having hooks which fit into the slots. The fastener is flexible, easily attached and can be opened and closed an indefinite number of times. Lakewood Fabric Belting & Mfg. Co., Lakewood, Ohio.

Dann Insert

The Dann Insert is a method of oiling the spring which by the increased spring flexibility due to its use it in reality serves the same purpose as a shock absorber. Thus when the spring leaves of a spring assembly are free to work throughout their entire length, there is a much less tendency for the road shocks to be transmitted to the occupants of the car. This is the function which the Dann Inserts accomplish when they are installed in the springs. The insert in reality consists of very thin sheets of bronze which are placed between the spring leaves and thoroughly packed with graphite, thus acting as a bearing for each spring leaf.—Dann Products Co., Cleveland, Ohio.

Cinch Curtain Fastener

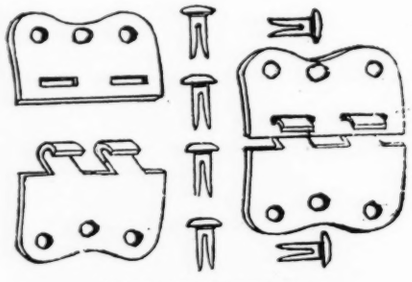
The Cinch curtain fastener is a new device which operates in a very simple manner, has a positive lock, will not tear fabrics and is durable. It has an attractice appearance and is very easily attched to the fabric. L. C. Chase & Co., Boston, Mass.

Rayfield Thermostat

The Rayfield thermostat is an instrument to control the cooling water temperature of a motor car, truck or tractor engine having forced circulation. The chief feature of the thermostat is that it stops circulation in the cylinder block when the engine is cold but does not prevent water circulation in the radiator. This is accomplished by two butterfly valves linked together with the expansion coil which opens the upper valve and closes the lower one when the circulating water reaches a temperature of 170 deg. Fahr., permitting circulation through the radiator, whereas if the engine is cold the upper valve is closed and the lower one open, water circulates through the radiator and pump only. The water in the cylinder block is gradually displaced until all the water in the system is raised to the predetermined temperature which in this case is 170 deg. Fahr. The instrument sells for $15 and the extra fittings vary from $1.55 to $1.05, depending upon the make of car. Findeisen & Kropf Mfg. Co., Chicago.

Heiser reboring tool

Presto Y-plug



Lakewood belt fasteners

Presto Y-Plug

The Presto Y-plug consists of a Y-shaped electric light plug to be inserted on the instrument board of a car affording two separate connectors. Thus one side might be used for a dash lamp bulb while the other affords ready means for attaching a trouble lamp. The same device might be used also as a cluster socket for limousines or other inclosed cars. The plug is made to take either single or double contact bulbs. Metal Specialties Co., Chicago.

Handy Terminal

The Handy terminal is in effect a cable terminal and spark plug terminal in one. The jaws are threaded on the inside and engage the threads of the spark plug center bolt. One motion raises the ring, compresses the steel spring, releases the terminal and lifts it from the spark plug. No tool is required for attachment. The greater the vibration the tighter the jaws, so the device cannot work loose. The Handy comes in three sizes to fit all makes of spark plugs. Price, 25 cents—Francis-Rand Co., Cleveland, Ohio.

B & D Portable Electric Drills

The method of control characterizes the B & D drills, as by these means the operator has complete control of the machine. This is accomplished by a form of trigger control similar to that of an automatic pistol. The advantages of this are that it allows the operator to withdraw the drill after drilling without the possibility of breaking the drill.—Black & Decker Mfg. Co., Baltimore, Md.

Weaver Auto Hoist

The Weaver hoist is a hoist suitable for ues in the ordinary garage. It is especially desirable on account of its being a combination of the block and tackle, the crane, the traveling hoist and the derrick with either single or double suspension, all in one unit. The hoist can be operated in very cramped quarters and will be found to be very useful in moving wrecks or dismantled cars from one part of a shop to another. The hoist has an overall height of from 8 to 9 ft. and a lifting capacity of about 3000 lb. Price, $100.—Weaver Mfg. Co., Springfield, Ill.

Carborundum Products

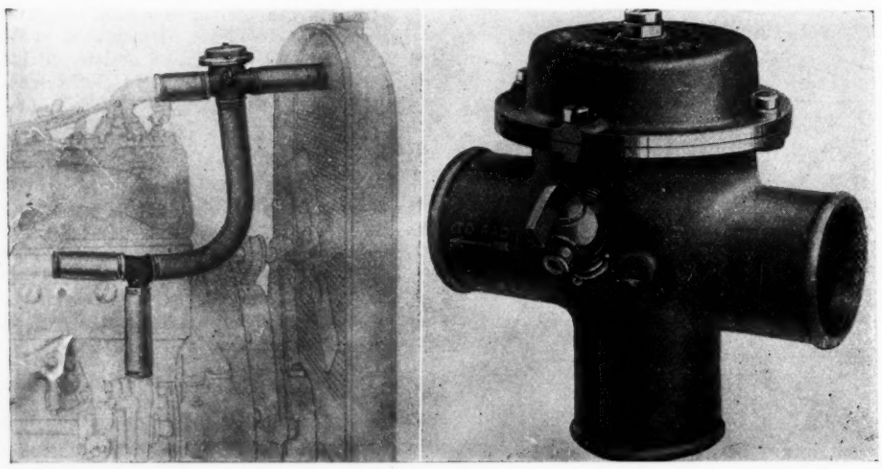
The Carborundum line consists of valve-grinding compounds and pastes, grinders, with twist drill attachment and grinder head for grinders, Aloxite cloth, a substitute for the old-time emery cloth, and Carborundum and Aloxite grinding wheels. All these are for garage use in particular. Carborundum Co., Niagara Falls, N. Y.

G. A. C. Accelerator Foot Rest

The rest is in the form of a heel support which is freely suspended so that it may be moved forward or backward. Its use is said to give a smooth action on the accelerator and prevent chocking of the engine on rough roads, wearing of the heel of the shoe, wearing holes in the mat, and wearying of the leg. Price, $1.25. General Appliance Co., Boston, Mass.

Corcoran-Victor

The Corcoran-Victor side lamp also can be used as a trouble lamp, as by raising or lowering the door the light can be directed downward at any angle desired. The reflector is fastened to the door instead of the body, and the door swings open on a hinge at the bottom, carrying the bulb and reflector with it. The connection between the door and reflector is solid to



Rayfield thermostat which tends to maintain the temperature at 170 deg. Fahr.

eliminate all rattle, and the bulb cannot get out of focus, it is claimed. The reflector is brass and the body is enameled black. The lamp has a neat door rim and streamline body. Corcoran-Victor Co., Cincinnati, Ohio.

Shutdown of Industry

(*Concluded from page* 18)

Detroit, Jan. 22—One of the biggest problems in connection with the closing of the plants here has been to get the men engaged in war work back to their places. Many of the plants which were given permission to resume work Monday or Tuesday had great difficulty in reaching their men, who believed that they were to be idle during the entire close-down period.

To-day the McCord Mfg. Co., the Continental Motors Corp., the Timken-Detroit Axle Co., and others sent out urgent pleas for employes to return, but it was impossible to get in touch with a large percentage of the men, with the result that war work has suffered delay. It was feared for a considerable time by plants which have been forced to close that the companies engaged in war work would hire the men who had been temporarily thrown out of employment by the edict, thus making them short in lines where there is an active demand for labor. This has not been done, however, to any extent.

The number of men who have been idle, due to the temporary shut-down, is 200,000 in this city alone. At first these men were very vigorous in their complaints, but this subsided and on the whole people had calmly accepted the situation by Monday morning. Manufacturers are making every effort to speed up production, in an effort to make up in some degree for the curtailment of the last five days, and it is very probable that big shifts of men will be employed on over-time work. With this in mind and with the knowledge that it takes a considerable amount of coal to start a plant in operation after it has been shut down, it is very doubtful whether the objects of the 4-day shut-down have been a complished. Conflicting orders and lack of a centralized bureau for handling matters in connection with the situation are the chief reasons for the failure to diminish the domestic and industrial coal crisis in Detroit.

Countrywide Reports

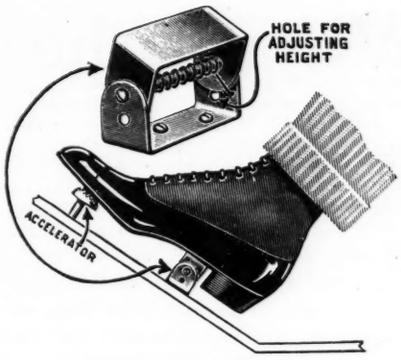
Milwaukee, Wis., Jan. 21—With the exception of the Wisconsin Motor Mfg. Co., every passenger car, motor truck, engine and parts factory in Milwaukee and vicinity closed entirely for the five days. More than 7500 men are out of employment. The Wisconsin company closed Friday but was permitted to open Monday to continue work on Liberty engines. Garages and repairshops closed tight on Mondays.

Kansas City, Mo., Jan. 21—No manufacturing industries have been closed here so far. Fuel administrators of Kansas, Missouri, Arkansas, Oklahoma, Nebraska, and Iowa are in conference here. It is their belief that industries will not be disturbed in their states. Office buildings and retail stores are being closed.

Minneapolis, Minn., Jan. 21—With few exceptions all car, truck, tractor and accessory factories shut down during the five days. Tire vulcanizers, repairshops and oil stations also have been closed. The tractor men are particularly anxious over the setback the enforced holidays has brought.

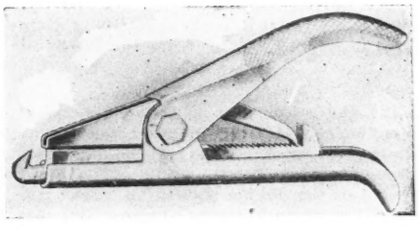
Baltimore, Md., Jan. 21—The fuel administrator's order almost passed over Baltimore. Only one firm, the Habershaw-Miller Co., Republic distributer, closed for the five-day period. On Saturday the Baltimore Automobile Dealers' Association obtained a ruling from the Maryland fuel administrator which allowed them to do business. In consequence practically all of the shops had their men on the job but did not use power and only such lights as were necessary. Dealers spurred their salesmen to go ahead with outside work and thus the industry was not greatly affected.

Indianapolis, Ind., Jan. 21—Work in the motor car manufacturing and selling fields was practically suspended. The Premier Motor Corp., which is working on government contracts, is the only one in operation to-day. Nordyke & Marmon are permitted to continue only on aviation work. The plants of the Cole, Stutz, National and Empire have been closed, as are all plants in Central Indiana not engaged on government work.



New York foot support

Handy cable and spark plug terminal



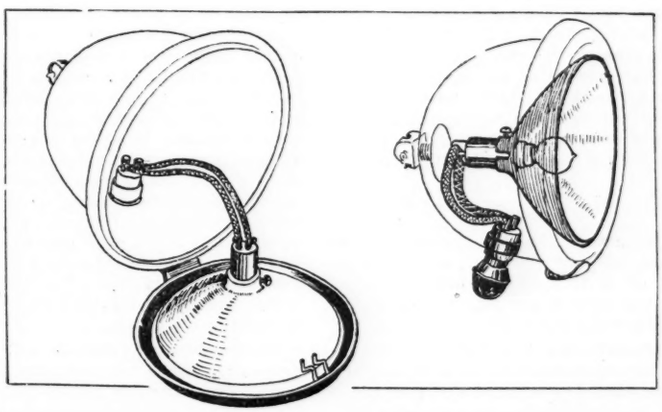
May's cotterpin puller

WISCONSIN MOTOR EXPANDS

Milwaukee, Wis., Jan. 22—The Wisconsin Motor Mfg. Co. has increased its capital stock to $1,000,000. An addition, quadrupling the capacity of the plant, has been completed and will be used mainly for assembling engines. It will have a floor space of 43,500 sq. ft. The old assembling plant has been converted into a machine shop.

WEIDLEY ORDER SWELLS

Indianapolis, Ind., Jan. 18—The contract of the Weidley Motors Co. of this city with the Cleveland Tractor Co. of Cleveland, Ohio, for the manufacture of $3,000,000 worth of tractor engines during three years, has been increased to an order calling for $20,000,000 worth. To meet the increased expense incident to filling the order the Weidley company today increased its preferred stock from $100,000 to $500,000. The company expects to increase its manufacturing capacity as soon as possible, and $150,000 will be expended in the construction of additional buildings and in the purchase of new equipment. The program calls for the construction of 15,000 engines the first year, 25,000 the second year and 30,000 the third year. The company is manufacturing at the present time from fifteen to twenty daily, and this number will be increased to 100 a day.



Corcoran-Victor side lamps

How and Why of the War Trucks

Some Details in the Creation of U. S. Standardized Military Vehicles

IN the early stages of the standardization of military truck design it was the idea to limit the interchangeability of parts to the complete units, such as engines, axles, transmissions, etc. Several meetings of parts makers were held, with a view of determining the degree to which their regular products could be standardized, so as to make them interchangeable in the chassis.

In the case of the engines it was found that a standard set of installing dimensions could be determined, which necessitated only slight changes for the various manufacturers. This would have made it possible to replace a damaged unit with one of another make, in case none of the original type were available.

However, the further this work progressed the more important it was considered by the War Department to have not only complete units interchangeable but all of the component parts of the units as well. It is obvious that this plan would greatly reduce the list of parts necessary for maintenance of the trucks at the front. When this decision had been made the engineers of various parts manufacturers were called to Washington to work up suitable designs to meet the requirements of the Government.

The division in charge of engine design was required to develop an engine with an output of at least 2,800 in.-lb. torque, which was necessary to give the tractive factor predetermined for these trucks. An average of the performance of various engines built in the past showed a torque of about 6¾ in.-lb. per cubic inch piston displacement. Using this figure as a basis, the piston displacement of the class B engine was determined at about 415 cu. in. in all. Possibly the most important consideration in the designing was that of keeping the wearing parts of these engines very large so that adjustments and replacements of parts would be required but seldom.

Adoption of Stroke

In arriving at the bore and stroke of this engine it was considered desirable to keep the ratio as high as possible, without obtaining too great a total weight of engine or too great a height over all. It was, therefore, the length of stroke which was the determining factor in the stroke-bore ratio. After a few sketches had been made of various ratios, a 6-in. stroke was finally adopted. This with a bore of 4¾ in. gives a piston displacement of 425 cu. in.

The normal speed of these engines was set at 1,050 r.p.m., which with the 6-in. stroke would give a piston speed of 1,050 ft. per minute. The speed of maximum horsepower was also predetermined at about 1,500 r.p.m. From past practice it was shown that the maximum horsepower of an engine was developed at a speed at which the theoretical gas velocity through the valves was about 14,000 ft. per minute. Assuming an engine speed of 1,500 r.p.m., the valve area should therefore be $(4\frac{3}{4})^2 - \times \frac{11}{4} \frac{1500}{14000} = 1.9$ sq. in.

This requires a valve 2⅛ in. diameter in the clear, 2⅝ in. outside diameter, 45 deg. seat, with a lift of $\frac{11}{64}$ in. At the normal engine speed this will give a gas velocity of 160 ft. per second through the valve.

With the heavier grades of gasoline in use at the present time the compression must be carried somewhat lower than was possible a few years ago, otherwise serious pounding will result in the cylinders. The displacement per cylinder also has some effect on the compression, since a larger cylinder has a smaller wall surface cooling effect per cubic inch of charge than a smaller engine. The past experience of the designers was again called upon, and from this a clearance volume of 24½ to 25 per cent of total volume was determined upon. This clearance will give a compression of about 65 lb. gage at slow cranking speeds.

SO much interest has been created by the new standardized military trucks, known as the class B, class A and class AA, that the discussion of the details of design and particularly the whys of the design are given here as a partial reprinting of papers by those responsible. That on the engine is by A .F. Milbrath, while G. W. Carlson discussed the axles.

The connecting rod of the military engines as compared with regular practice might be considered of the long type, it being 13¼ in., or 2.21 times the length of stroke, the standard practice varying from about 2 to 2.2 times stroke. Both upper and lower bearings are laid out central with the rod. The rod is of the I-beam section and the upper end is bronze bushed for the piston pin, while the lower end is of the four-bolt type.

The piston is 6⅛ in. long, with three ¼-in. rings of the conventional type with 45-deg. saw cut. The piston pin is 1⅝ in. in diameter and is located 2⅝ in. from the lower end of the piston. A single lockscrew holds the piston pin in place.

As the crankshaft is the backbone of an engine, considerable thought was given this important part. It is of the conventional three-bearing type. While the governed speed of the engine was to be 1,050 r.p.m., it was desired to keep the stresses and bearing pressures low even at 1,500 r.p.m.

The cylinders are cast in pairs, of the L type, with valves on the right side. The heads are removable and held in place by 13 ½-in. studs. The valve stems are inclosed by pressed steel cover plates. The water-jackets are very liberal, tapering from ½ in. below to 1¼ in. above. The spark plugs are screwed directly into the cylinder heads and the plugs are surrounded entirely by water. Cooling water enters the jackets at the lowest point and leaves the heads at the highest point. Thus no drain cocks are necessary.

The crankcase is cast of aluminum, and it is very deep and well ribbed. The parting line between the upper and lower half is 3 in. below the center line of the crankshaft.

The flywheel is inclosed in a No. 3 S. A. E. bell housing. Three-point suspension is employed, two arms cast onto the bell housing and a trunion bearing on the front gear cover. Shouldered studs with castle nuts are used for attaching the cylinders. Provision is made for the mounting of electric starters, and generators are mounted as regular equipment. The front gear cover is of cast iron, and on account of its acting as forward support it is well ribbed. The lower half of the crankcase forms the oil pan and entirely incloses the oil pump.

The camshaft is drop-forged with integral cams and flange for mounting of the driving gear. The cams are 1⅝ in. in diameter, with $\frac{11}{64}$-in. lift. The timing is as follows: Inlet opens 15 deg. past top center and closes 35 deg. past lower center; exhaust opens 45 deg. before lower center and closes 5 deg. past top center. The camshaft bearings are a trifle larger than the cams, so the shaft can be easily withdrawn.

The timing gears are 1¼ in. wide, teeth cut on an angle of 27¼ deg.—9 pitch. The drive is from the crankshaft gear through an idler to the camshaft and water pump gears, and from the camshaft to the generator drive gear.

The valve tappets are hollow, 1⅛ in. in diameter, of the roller type. They carry adjusting screws 1 in. in diameter, also bored hollow.

The oiling system is of the force-feed type, embodying a gear-type circulating pump. No oil pipes are used, the oil being forced through a passage drilled in the pump body to a header extending the full length of the crankcase, then through drilled passages to the main bearings. Grooves are provided in the main bearings, which constantly communicate with the oil holes drilled through the crankshaft to the connecting rods. Oil tubes on the connecting rods lead oil to the piston pins. A relief valve set for 10-lb. pressure is fitted to the front end of the main oil header, and the overflow from this valve lubricates the gears.

The oil pan or lower half of the crankcase is so formed that the oil will drain toward the center of the sump, even though the engine is inclined, as in climbing or descending a hill.

Passage of Oil

The oil drains from the crank chamber through a spout into a settling chamber, where any water and mud settles and can be drained off from time to time. As the oil rises in the settling chamber it finally overflows the top into a large strainer, which completely surrounds the settling chamber. Through this strainer the oil flows by gravity into the sump proper. The oil pump is supported from the upper crankcase and extends down into the sump. Another strainer surrounds the oil pump, so the oil is cleaned quite thoroughly. No parts except the settling chamber and large strainer are attached to the lower half of crankcase, so this can be dropped by taking out the bolts, without interfering with anything else. No oil float of any kind is used, but a graduated test rod is fitted, which can be withdrawn to ascertain the amount of oil in the engine.

Two entirely independent systems of ignition are incorporated, a high-tension magneto, which is driven off the rear end of the water pump shaft, and a combined timer and distributor with coil mounted at the forward end of the engine, on the left side, and driven through helical gears from the water pump drive shaft. Two sets of spark plugs are fitted into the heads of the cylinders, and the engine can be run on either one or both of the systems.

The inlet and exhaust manifolds are on the right side of the engine. A heating chamber is cast integral with the inlet manifold near the center, where the vertical branch from the carbureter joins the horizontal section. This heating chamber bolts directly to the exhaust manifold at a point where an opening is cast in it, so that the hot gases can circulate around the inlet manifold. This forms a hot spot about 4 or 5 in. long, which helps to vaporize the fuel and permits the use of low grades of gasoline.

A 22-in. fan, especially designed for these

trucks, after a long series of tests, is mounted on a rigid bracket, bolted to the crankcase. The fan is provided with a vertical adjustment for taking up the slack in the belt. This, however, will be necessary but seldom, as a 2-in. belt and large pulleys are fitted, which will drive the fan when set up with only a slight tension.

An entirely inclosed governor, driven off the forward end of the generator shaft, is built into the engine. The centrifugal members of this governor consist of four 1-in. steel balls, held in place by a spider.

On their outward movement these balls travel against the face of a 45-deg. disk, which also gives the balls a longitudinal movement against a collar free to slide on the governor shaft. The collar has a movement of $\frac{1}{8}$ in., which is transmitted through a vertical lever, multiplying the movement three-fold. A link with ball joints connects the upper end of the lever with a throttle spindle in the inlet manifold. A spring is fitted to the vertical lever, and an adjustment with a seal is provided. The governor revolves at about one and a half times engine speed, and the thrust from the balls is 34 lb.

Program on Axles

When the Government first summoned the engineers to Washington to design a United States army truck, the axle engineers were divided into three groups, representing worm, internal gear and double reduction type of final drive. The program was to design and build two or more of each type. These were then to be tested, and the type to be adopted was to be based upon the all-around performance as shown by the tests.

The limited time, however, upset this procedure, and it became necessary to make a quick decision, at least in the case of the class B design. It is not necessary to here discuss the purpose the War Department had in view in its selection of the worm type for the class B axle. Suffice it to say that the wide use of this type as well as the production conditions were large factors. The question of performance and absolute reliability through critical periods eliminated all inclinations on the part of the engineers to introduce features of an experimental nature. The governing keynote is sturdiness, simplicity of construction and simplification of the field service problem.

An instance of the latter is manifested in the class B axles particularly, in which only three bearing sizes are used in the front and rear—the front inner bearing interchanging with the worm bearings—the rear wheel bearings being alike and interchanging with the differential bearings, and the front wheel outer the only odd size. The front carries only one size of screw, a total of forty-four being used. Such is also the case in the rear, where the only right and left-hand parts are the wheel-spindle nuts and the brake anchors. The brake levers, brake shafts, shaft brackets and toggles are all interchangeable.

The class A and B front axles are, except for proportionate dimensions, the same. The hub closure is designed with the object of presenting the smallest diameter for the felt rubbing face. A flange on the felt retainer rotating within a groove in the knuckle prevents the dirt from reaching the felt, and an additional groove immediately outside the felt is intended to divert any water reaching it, except possibly at the bottom.

Particular attention has been paid to the lubrication of the knuckle pin. This is made of carbon steel, hardened and ground, the bushings being of similar material and pressed into the ends of the center forging, this construction providing a wide bearing spread. The hollow pin contains an oil wick, the ample dimensions of which allow for a generous supply of oil.

Since the ordinary grease commonly used for lubricating this particular place leaves much to be desired, it was argued that even at the expense of considerable leakage oil would be preferable. The experience with the samples is ample testimony of the soundness of this reasoning.

The thrust washers are grooved, the oil entering through recesses next to the pin. The dust device consists of a brass ring floating in opposite circular grooves in the washers. The bottom of the knuckle is closed by a similar expanding ring. These rings are intended more to keep out the dirt than to keep in the oil.

The cross tube end pins are fastened to the arms to allow for the maximum bearing surface with minimum weight. A draw key is used for this purpose. The bushings are pressed into the end forging. The lubrication is by oil. No attempt is made to hold the oil, a self-feeding oiler being used.

The regular Elliot type was chosen because of the opportunity it presented of bringing the pivot centers close to gage line, and because it was a simpler manufacturing proposition.

The class AA front axle is of similar type, without the refinements of detail used in the A and B design. This was necessary because of the limited weight allowed for the lightest axle. The general construction is distinctly passenger type. The lubrication is all with grease, the limitations imposed, as before stated, not permitting a design suitable for oil without approaching features of an experimental nature.

The hubs, unlike those of the two heavier types, are of pressed steel, which embodies the necessary strength with additional lightness. The material is otherwise the same as for the A and B, part for part.

During the early stage of development of the class B truck, it became apparent that the weight would far exceed that of the commercial 3½-ton truck. This, coupled with the severity of service, brought about a design which, for strength, compares favorably with the average 5-ton commercial rear axle. The weight alone, however, was not the only determining factor. The War Department specification for the locking differential necessitated a shaft diameter of a size that put the bearings and tubes into the 5-ton class.

These conditions made it possible, without any sacrifice, to use one size of bearing for the wheels and differential. The drive-plates are shrunk onto the shafts, ten splines being used in each end, and piloted into the hub flange, to which it is secured by fourteen ½-in. bolts. Studs were considered, but through bolts were given preference.

The housing construction is of a Timken type, either cast or forged steel, with a square section from the center bowl out. The tubes are pressed into place, a retaining screw being provided for safety. The tube extends to the bowl of the housing, and a reinforcing plate is fitted over the inner end and riveted or welded to the top and bottom of the housing shell.

One Bearing Size

The forged steel spring-seats are in two parts, top and bottom, each fitted over the housing on machined surfaces and doweled for side position.

The worm and gear are of the David Brown type, with an 8⅝-in. center distance. The pressure angle is 30 deg., the linear pitch 1.1562 in., and the lead angle is 24 deg. 20 min. Compared with the sizes used in commercial trucks, this design appears somewhat inadequate. The limiting factor, however, is ground clearance, which the military authorities considered so necessary as to sacrifice possibly the maximum life of the worm gear. It might be mentioned that the samples, giving due consideration to the comparatively short mileage, do not indicate that such a sacrifice has been made.

The gear is mounted on the differential by corrugations 3.16 by $\frac{1}{8}$ in. on one side for half the width of the gear seat and piloted by the other side. It is secured against side thrust by a ring held by twelve rivets and against a shoulder on the opposite side. The mounting, although not new, gives large space for the differential as well as economy in bronze.

The differential originally chosen was of a well-known locking type, but because of the comparatively small number in use for this capacity a common type was substituted. This question has since been reopened, and at present the War Department is considering three possibilities, the common type, the locking type or no differential at all. The locking differentials on the samples so far have given complete satisfaction and seem to be adequate from the standpoint both of strength and wear. It is, however, a proprietary article, thereby conflicting with the Government's policy.

Unit Is Removable

The differential worm and gear are mounted on a carrier piloted at the top of the housing. The gear adjustment is made by slotted and threaded rings in back of the bearing caps. The cups are clamped to the main pedestals by caps, nickel steel studs 1 in. diameter being used. The whole unit can be removed from the housing without disturbing any adjustments.

Throughout the axle the various parts have, wherever possible, been so designed as to permit assembling and dissembling as the following units: First, the shaft and drive-plates; second, the wheel, drum, bearings and dust washer; third, the brake anchor and bands, levers, shafts, and fourth, carrier and parts.

The brakes are side by side and are made of rolled stock, toggle operated, 24-in. diameter and 2 1/9-in. wide. The proper place for brakes is unquestionably on the rear wheels, provided they can be made of a size large enough to be dependable. Since the War Department permitted a 24-in. diameter the problem was merely one of designing a brake easy of adjustment and of dissembling or relining. The toggle brake in this instance was given preference because it made accurate forming of bands and machining unnecessary. The objection raised on account of the rattle is a secondary item when the braking power available is taken into consideration.

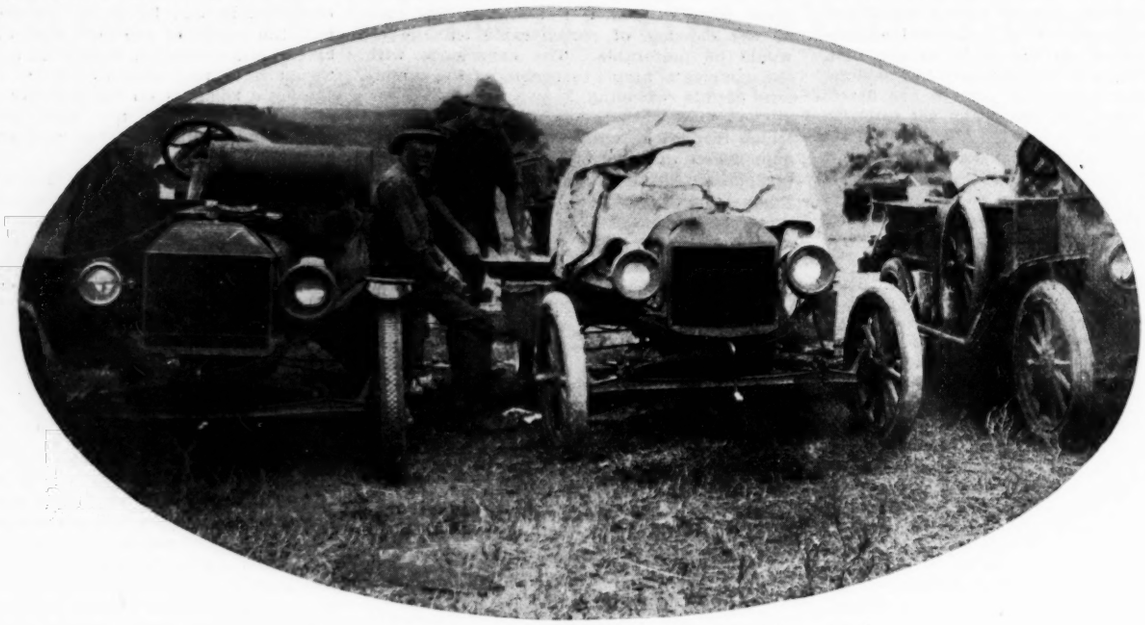
Besides the anchor and supporting pin, which is square, three additional adjusting screws are provided for each band, designed to make adjustments possible without removing the wheel and drum. These have mushroom heads to prevent pounding into the softer metal of the band. The drums are pressed steel, flanged to give rigidity. S. A. E. materials and standards are used throughout.

All bearings are tapered roller except the internal gear spur pinion and the wheel bearings on the class A truck, which are of straight roller type. The manufacturers making the internal gear axles recommend this practice on the ground that failure to adjust would cause a misalignment of the gears.

Oilers and grease cups have been omitted wherever possible and pipe plugs substituted.

The internal-gear type axle was selected for the class A rear axle, first, because of the available manufacturing facilities, and second, because of the high ground clearance desired.

The countershaft was located in the rear of the load-carrying member. First, it made possible a simple assembling job; second, gear adjustment can be made simply by removing the rear cover plate, as in current passenger practice, and, third, the lighter weights thus secured.



An evening halt on one of the lines of communication in Central Africa—British soldiers and army motors

In the War Zone of the Veldt

Motoring Possibilities in the Union of South Africa

In Two Parts—Part I

JOHANNESBURG, South Africa, Sept. 1—The Union of South Africa is perhaps as vague a territory to many Americans as British India, the Strait Settlements, or other far remote sections. Were it not for the fabulous diamond mines of Kimberley and the Boer War of 1900, which familiarized the veldt—pronounced felt—and the Zulu Wars, many would not be familiar with this part of the second oldest continent. This Union is much in the public eye at present, as a part of the war is being fought between the German provinces in Africa and the Union of British South Africa. Greater land areas have passed from German to Allied hands in South Africa than many imagine.

As a result of the 1900 Boer War a territory as large as California changed hands, to be annexed by the British government and ruled by it until 1910, when the Transvaal and Orange Free State, the two colonies forming the captured territory, were given the right to rule themselves and linked up with Natal and Cape Colony, two territories as large as Nevada, Arizona and Utah, which had been British for nearly 100 years, the joining of the four colonies forming what is known as the Union of South Africa. This Union practically amounted to giving the country back to the Boers, as they are in the majority, and the first elected government, a Dutch one, has remained in power. Thus, a United States of South Africa came into being, with a democratic government, bound only by the name British Colony to the mother country, entirely apart in fact and deed, being left to mar or make itself, incidentally looking toward the greater U. S. A. as an ideal to be attained.

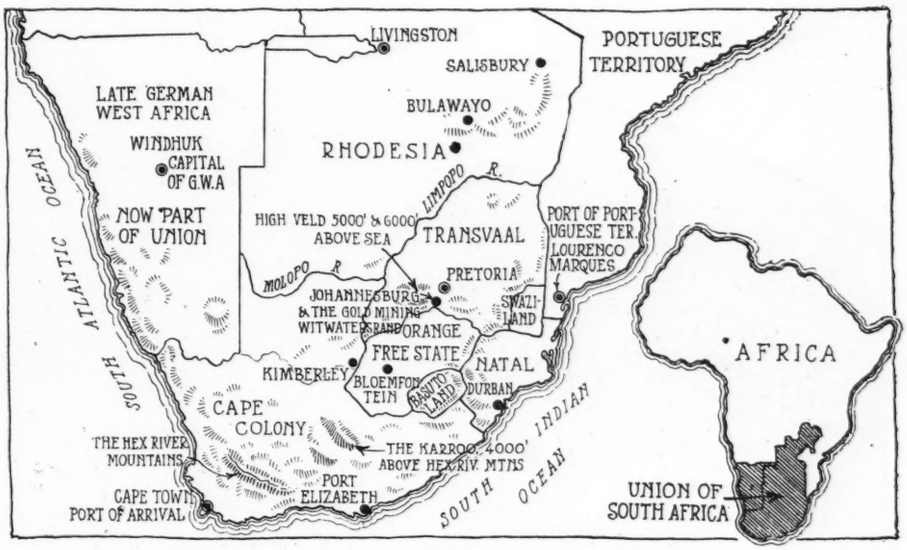
Since the union the progress in this direction has been remarkable, in spite of the rather unprogressive government, and in few other countries outside the United States is Americanization so noticeable. Each of the four original colonies of the union has its own provincial council to make laws subject to the government's approval, amounting to the individual state control here.

The result of the present world struggle has been, up to the present, the addition to the union of German West Africa, a

This photgoraph is of native trekking over the veldt, on the bank of the Vaal river

tract of country equal in area to the states of Texas and New Mexico, and as yet entirely undeveloped, but valuable, conquered by Boer and Briton for the union. The other British territory in South Africa is Rhodesia, that has within its boundaries the great Victoria Falls, Niagara's African rival. An enormous stretch of country with a wonderful store of mineral wealth and great ranching possibilities, practically leased to a land company, it has not gone ahead, refusing to join up with the Union in 1910. Rhodesia could hold within its boundaries the six states of Oregon, Idaho, Wyoming, Montana, Colorado and Kansas, and is what is known truly as British South Africa, the B. S. A. of the chartered land company. Indications point to Rhodesia linking up with the Union in the very near future. With the annexation of German West Africa, the Portuguese territory along the east coast remains the only possession of any other European power in British South Africa.

The white population of the whole union only equals that of the city of Philadelphia, 1,250,000, living among black races numbering nearly 10,000,000 and practically all dependent on the great gold mining industry of the interior. As in the United States, the cities now are playing the greater part in the development of the motor car trade, the future lying with the agricultural population. The southern and older colonies, Natal and Cape Colony, can be compared with the eastern states: Transvaal, Orange Free State and the newly conquered German West Africa being the Middle West of the Union, where the newcomers go and towns and villages grow to cities with new ideas.



This map of the Union of South Africa is attended by one showing the relation of the Union to all Africa

Cities of the Union

Cape Town, the oldest and largest port, can be termed the New York of South Africa, a small one it is true, with a white population of only 125,000, but an up-to-date city with steel construction buildings up to ten stories, extensive street car systems and a fine appearance. It is the port of arrival, almost 7000 miles from New York, and twenty-eight days' journey over the Atlantic with one intermediate port of call.

Durban, Natal, is the most progressive port, being nearest the rich interior, and for the last three years nearly all the motor car consignments for the union have arrived there, to be distributed by rail to the various centers. A most beautiful semi-tropical place, with the appearance of a Californian city, it has a population of 70,000, steadily increasing. As a motor car center it covers the whole Natal colony with its progressive sugar farms and the industries connected with them.

About 1000 miles inland from Cape Town, as is Chicago from New York, is the progressive mushroom city of Johannesburg. It has risen from a few prospectors' tents twenty-five years ago and now has a population of 160,000 white persons, surrounded by other cities on a 60-mile strip of gold-bearing reef, the Witwatersrand, known as the Rand. The white population of the Rand is more than 250,000, with 450,000 blacks, that is, natives, mostly Zulus, including a few thousand Asiatics, 320,000 of these, all natives, employed by the gold mining companies. Johannesburg rightly has been called the Hub of South Africa. It is the motor car center and the head offices for the greater part of the car agencies are there, sub-agencies and branches being situated in the principal towns. So large has the motor business become that since 1915 a large portion of the city, in area about fifteen blocks, has been built up completely with garages and showrooms, to be known as the motor center.

The effects of Americanization are noticeable to such a great extent that it would be difficult for a visitor to imagine himself elsewhere than in one of the U. S. A.'s growing cities. Motor cars line the pavements of the shopping streets, horse cabs fast are disappearing, and the fleet of taxicabs steadily is increasing.

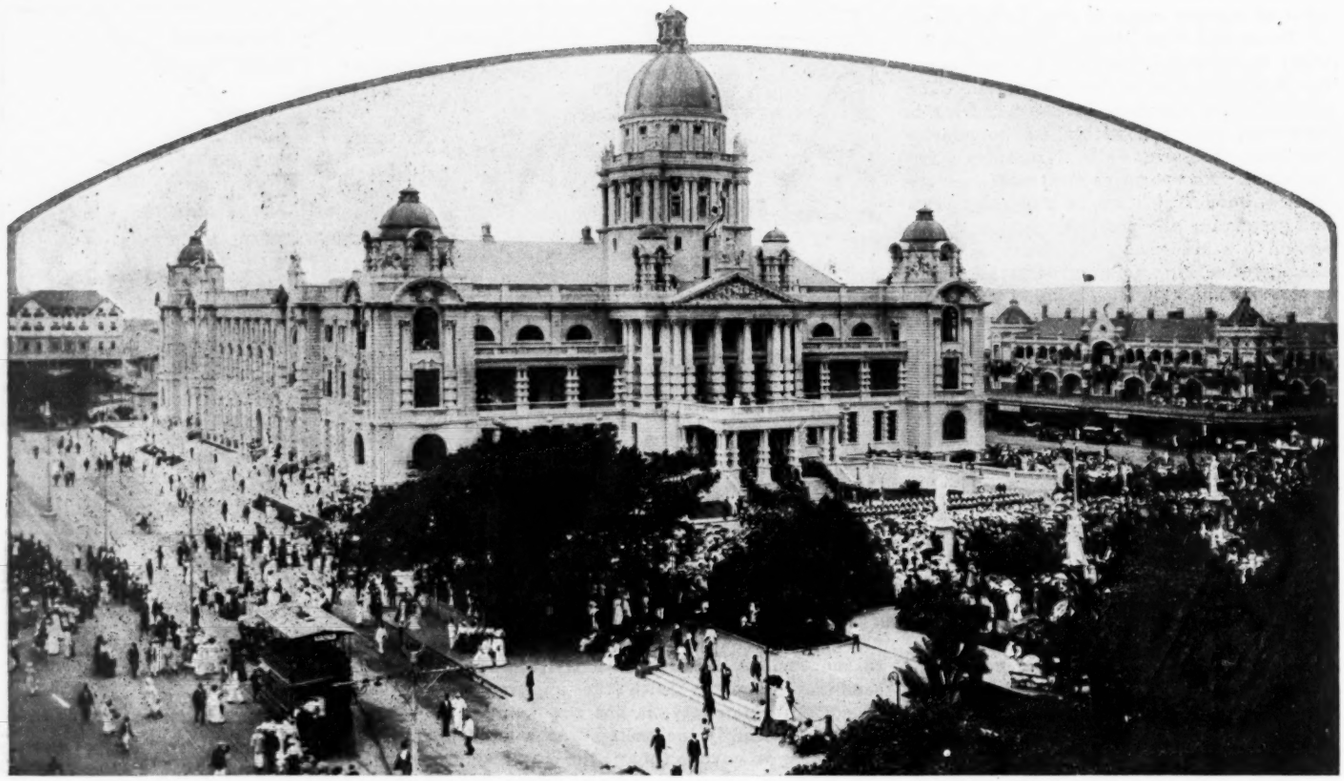
It is worth mentioning that all the taxis are owned by the drivers, due to the garage system allowing a man to pay 50 and 20 per cent of his profits a month off the cost of the car, which naturally has not made for uniformity in the ranks. A glance at any rank shows all classes of cabs from the Ford to Cadillacs and Napiers, mostly well kept, the owner-driver suiting his pocket and taste in choosing his vehicle.

New Cities Open

Cities constantly are growing around Johannesburg with the opening of new ground by the mines, the latest one being Benoni. Four years ago Benoni was a settlement of 2000 miners, 20 miles east of Johannesburg. Now it is a city of 25,000 with fine buildings and good streets. In all these new centers the draft-board laying out system is used, with equal blocks, numbered streets and avenues.

The Motor Traders' Association, which in a small way is a motor car chamber of commerce, recently has been formed, its members including practically all the American car agents and concessionaires of the country. It is conducted with the Transvaal Automobile Club, the largest and most progressive organization of its sort. Five miles from the center of the city, the roads of approach being macadamized and asphalted, it has now more than 800 members and branches in the towns of the Transvaal. The Transvaal, Natal and Cape Colony clubs have done good work in the placing of signs and the making of road maps covering their territories. On the main roads and in the municipal areas of the cities signs are to be seen, telling of hairpin bends, hills, schools and hospitals.

Compare this with the facing trekkers—both are from Africa



Here is a building that would do credit to any city of the world, and yet many think of all Africa as a part of a "Darkest Africa"

We all have our troubles. This man met his 400 miles from Johannesburg—sand in the gear box of the car causes his predicament

Pretoria, the capital of the Union of South Africa, is 35 miles from the Rand, a good road connecting it with Johannesburg. Although the capital of five provinces, it is the smallest city in importance as a trade center, and was made the administrative town after the union only as an act of grace to the Boers, it being the capital of the Transvaal before the Boer war of 1900. It has many fine buildings, the Union building, costing $15,000,000, being the finest in any of Britain's overseas dominions. Still, it remains a sleepy town, with a non-increasing population of 30,000, mostly Boers.

Scattered over the country are many cities and towns, some of them go-ahead, all progressive enough to possess garages and motor traffic in proportion to their size. The two ports, East London and Port Elizabeth, are both cities with populations of more than 25,000, good centers for rich farming districts. But the live center is the rich Rand.

The Diamond City

Kimberley, the diamond city, is an example of a kind common enough in parts of this country, one that has sprung up in a rush, an unsubstantial town whose population fluctuates between 15,000 and 60,000 in a year, entirely dependent on the diamond market. For established trade it has a bad name, and is the least known, except by repute, of South Africa's larger towns.

The conquered German territory has as yet a very small white population, with two small towns. Settlement from the Union gradually is taking place, but the unfavorable conditions of the larger portion of the country, together with its turbulent native tribe, the Herrosos, make farming dangerous and disheartening. The greater portion of the land is desert.

Although a good number of the U. S. A.'s cars are represented there, some makes remain practically unknown. Such American cars as the Packard and Pierce-Arrow are not known except by name, although Cadillac, Franklin and Chalmers are represented.

In the huge area of country covered by the Union it is only natural that there should be many physical conditions similar to those in America. That part of the country spoken of as the Karroo is nothing more or less than prairie land, rolling country, brown tinged and waterless for distances of 100 miles or more. The only really characteristic feature of the Karroo is its flat-topped hills, or kopjes, which do not exceed a height of 500 ft., dotted over the country at irregular distances, in no way interfering with the making of roads or railways. Veldt is a vague term, generally meaning any flat or gently rolling country. There are very few real forests, the country sparsely covered by big trees being called bush-veldt to distinguish it from the veldt.

Reaching the Union farmer brings one to the question of roads. There are more than 30,000 miles of government roads in the country, which sounds good, but it is only when traveling over or trying to find some of them that one realizes how isolated some towns and villages really are. Cape Colony can boast of far better roads than the rest of the Union, this being due to the fact that it is the oldest colony, and the only way into the interior is through a natural mountain barrier, well graded roads being essential for communication with the rich inland. The rise from the coast to the Witwatersrand and Johannesburg is 6000 ft. and from Cape Town most of this rise is accomplished in 200 miles, climbing up the Hex River mountains to a height of 4000 ft. The rest of the climb is moderate, the Great Karroo, as the tableland above the Hex River mountains is called, sloping up to Johannesburg, 2000 ft. above, in a distance of more than 800 miles.

Few Rivers Bridged

Comparatively few of these are bridged except where the road crosses near the railway. Nearly all river crossing is done by fording at a spot where the river is spread out and shallow. The Orange river, the largest in the sub-continent south of the great Zambesi, is only 2 or 3 ft. deep at the fords, but it comes up as high as 20 ft. at the same spot after a few hours of heavy rain. The public works department has had the matter in hand for years and gradually is bridging streams and making culverts, but the less frequently used ones will have to wait a long time before they are improved materially. Even the main roads are not built in the strict sense of the word except near the cities, the South Africa method of road construction being to dig up the grass and let the traffic do the rest. And it does

American trucks on a good Central Africa road. These motors are for the armies in German South Africa

do it, especially in the rainy season, when the heavy ox-wagons sink 6 in. or more in the mud, the impression hardening in the heat, so that a few days without rain makes the road full of ruts, while rainy weather makes it axle-deep in mud.

Union's Busiest Road

The busiest road in the Union for motor traffic is between Durban and Johannesburg, 480 miles. The big nuisance on this and every other Union road is gates, there being more than 100 to open and close on this trip. The farms are not fenced along the road, the farmer having a gate at either end of his farm if a road runs through it, to keep his cattle from straying. It would not be so bad if they were all easily opened, but in many cases they are contraptions of barbed wire strung from pole to pole that drop as soon as opened and get entangled before they can be closed again. Recently quite a few motorists have traveled up by road from Cape Town to Johannesburg, 1000 miles, and all agree that the roads are really bad only when it has rained hard. The road is better through the mountains than on the Great Karroo. There are 400 gates to worry the tourist, counting the railway crossings, which mostly have a gate on either side. The level crossing danger is a considerable one and the various motor clubs are continually in communication with the government railways regarding it. As a direct consequence of this campaign, and several bad accidents crowded into a few weeks, booms and watchmen are taking the place of the gates in the busier districts. More than 10,000 miles of government railroad now cover the Union.

The main road from Cape Town to the Rand touches many towns that are not fed by the railway, but an idea of the distance between centers in South Africa can be gleaned from the fact that on this road, between Cape Town and Kimberley, the diamond city, there is no town of more than 4000 inhabitants. The distance is 700 miles odd, and the next city is Johannesburg, 250 miles away, with only three or four towns of more than 2000 whites between. A journey over the Karroo is depressing. Hundreds of miles of veld without a tree or any really green grass to relieve the monotony, and every 50 to 100 miles a small town or village with farms dotted sparsely between.

Before this war, the wealthy people of whom the Union of South Africa, and the Rand in particular, had more than a fair share, owing to the gold-mining industry, went in for British and French cars of the Renault, Daimler, Argyle, Napier and Rolls-Royce type, there being agents for all these cars in Cape Town, Johannesburg and Durban. In conversation relating to car matters it was usual to compare these cars with U. S. A. cars selling at far lower prices, which was unfair to the American product. Now that agents of these European cars are unable to get any consignments owing to the Allied governments having commandeered the whole output until the end of hostilities, they are looking for better-class American cars of the $2,000 and $3,000 type to take their place. The prejudice no doubt will remain for some time, but it is hoped that the importation of U. S. A. high-grade cars soon will prove them rich men's cars in every sense.

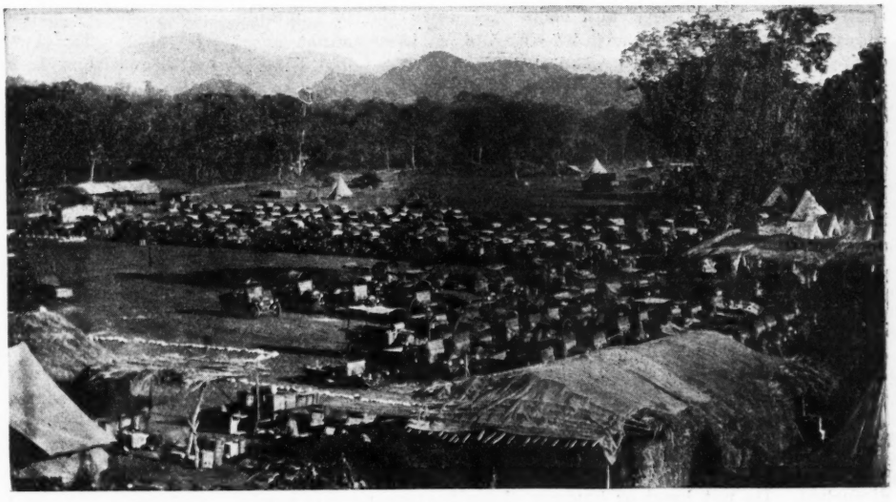
Motor cars always have been high-priced in the Union of South Africa, and the war with its almost prohibitive shipping rates naturally has increased prices. Shipping from the United States to South Africa before the end of 1914 was only $2.50 a ton. It has risen to $75 and is hard to get at that. The customs duty is 25 per cent, so that by the time a car is retailed 100 per cent and more is added to the retail price in America. Agents seem fairly satisfied on the whole with the U. S. A. motor car manufacturers, but just now it is felt that sufficient care is not given to the packing of the cars to economize the space that is so valuable. This complaint is more against the New York shipping houses, however. The following will give an idea of prices of 1917 models in South Africa. The South African Government Railways freight rates are very reasonable, and it only costs another $50 average to bring the cars up from the coast to the Johannesburg market.

Retail Prices Prevalent in the Union in June, 1917

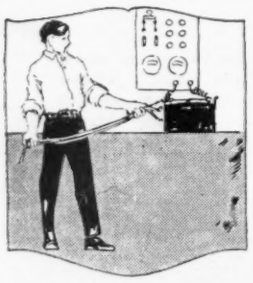
Ford	$ 920	Reo	$1,800
Chevrolet	1,150	Hupmobile	2,000
Maxwell	1,375	Dodge	1,600
Saxon	1,100	Scripps-Booth	1,550
Pullman	1,600	Chalmers	2,800
Overland	1,600	Franklin	2,800
Oakland	1,625	Cadillac	3,000
Buick	1,750		

Prices fluctuate $50 every few weeks.

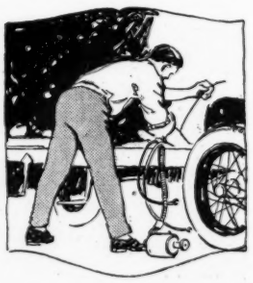
The public are paying these prices willingly and rises of $50 do not deter real car buyers, so that as long as freights are obtainable at all, the market can absorb all the cars landed.



Were this other than a bird's-eye view you would see this this is a convoy of Ford cars used by the British army



Electrical Equipment of the Motor Car



By David Penn Moreton & Darwin S. Hatch.

Editor's Note—Herewith is presented the seventy-eighth installment of a weekly series of articles begun in MOTOR AGE. *issue of June 29, 1916, designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the U. P. C. Book Co., Inc., New York, in a size to fit the pocket conveniently.*

The fundamentals of electrical circuits of the motor car were explained through their analogy to water systems, and the relations of current pressure and resistance were brought out. This was followed by an explanation of series and multiple circuits, how electricity is made to do work in lighting, starting, signalling, etc. Calculating the capacity of a battery for starting and lighting and the cost of charging storage batteries and determining the torque a starting motor must develop were explained. Action of primary batteries and dry cells was considered. A section was devoted to the makeup and action of lead and Edison storage batteries, and another to the care of lead batteries in service and the best methods of charging them. Magnets and electromagnetism then were considered, and the principles of generators and motors explained. A section on generator output was followed by one on the purpose and operation of the cutout. Electric motors and engine and motor connections then were considered. Ignition was taken up next.

Part LXXIX—Ford Ignition and Lighting Concluded

IF the engine speeds up there is an increase in the frequency of the generated electrical pressure, and also an increase in the value of the electrical pressure, but the increase in electrical pressure is offset to a certain extent by the increase in the effect of the inductance due to the increase in frequency and the current through the lamp will remain nearer constant in value than it would if a resistance alone were used.

Ignition Trouble

The uneven sputter and bang of the exhaust means that one or more cylinders are exploding irregularly or not at all and that the trouble should be treated promptly and overcome. Misfiring, if allowed to continue, will in time injure the engine and the entire mechanism. If you would be known as a good driver, you will be satisfied only with a soft steady purr from the exhaust, and if anything goes wrong, stop and fix it if possible rather than waiting until you get home.

A missing cylinder can be detected by manipulating the vibrator on the spark coils. Open the throttle until the engine is running at a good speed and then hold down the two outside vibrators, Nos. 1 and 4, with the fingers, so they cannot buzz. This cuts out the two corresponding cylinders, No. 1 and 4, leaving only Nos. 2 and 3 running. If the two cylinders, Nos. 2 and 3 explode regularly, it is obvious that the trouble is in either cylinder No. 1 or No. 4, or both. Now relieve No. 4 vibrator and hold down No. 2 vibrator and No. 3 vibrator and also No. 1 vibrator. If No. 4 cylinder explodes evenly, it is evident the trouble is in some other cylinder. In this manner all the cylinders in turn may be tested until the trouble is located. Examine the spark plug and vibrator of the cylinder in trouble.

The gap in the spark plug should be approximately $\frac{1}{32}$ inch in length and the plug should be free from an undue accumulation of grease and carbon. If the points in the vibrator are pitted, they should be filed flat with a fine double-faced file and the adjusting thumb nut turned down so that with the spring held down, the gap between the points will be a trifle less than $\frac{1}{32}$ inch. Then set the lock nut so that the adjustment cannot be disturbed. Do not bend or hammer the vibrators, as this would effect the operation of the cushion spring on the vibrator bridge and reduce the efficiency of the unit.

If with the vibrator properly adjusted and the plug cleaned and adjusted the cylinder still fails to operate, then examine the wiring and connections carefully for loose connections and open circuits. The coil itself may be tested by changing it and some other coil which is operating correctly. If the cylinder still fails to operate properly after making the above tests, the trouble is probably due to an improperly seated valve, worn timer or short-circuit in the timer wiring. The valves in each cylinder may be tested by lifting the starting crank slowly the length of each cylinder in turn, a strong or weak compression in any particular cylinder easily being detected. It sometimes happens that the packing between the cylinder head and the cylinder becomes leaky, thus permitting the gas under compression to escape, a condition that can be detected by running a little lubricating oil around the edge of the packing and noticing whether bubbles appear or not.

The surface of the circle in the timer around which the roller travels should be clean and smooth, so that the roller makes a perfect contact at all points. Should the roller fail to make a good contact on any one of the four contact points, its corresponding cylinder will not fire. The surfaces should be cleaned with gasoline. In case the fiber, contact points and roller of the timer are badly worn the most satisfactory remedy is to replace them with new parts. The spring in the timer should be strong enough to make a firm contact between the roller and the four contact points, as the roller is made to rotate by the gearing connecting it to the engine. Carefully inspect the four wires leading from the primary terminals of the coil box to the four binding posts on the timer to see that they are not shorted or broken and that the ends at the timer are not in contact with the case, thus causing a more or less perfect ground connection.

Oil Troubles

In very cold weather the very best grades of oil are likely to congeal to some extent, and if this happens the roller may be prevented from making perfect contact with the contact points embedded in the fiber. To overcome the possibilities of an occurrence of this kind and also to prevent the contact points from rusting, a mixture of 25 per cent kerosene with the commutator lubricating oil is recommended, which will thin it sufficiently to prevent congealing or freezing, as it is commonly called.

American Girl Driving Truck Abroad

Letters from France Tell of French Life

Here are some of the members of the Motor Corps of America with the ambulance they will drive in France

THOUGH it does not seem to be generally known, America has her own representation among the women who are serving as ambulance and truck drivers in the war zone. For this reason, if for no other, the quotation of a letter reproduced in the house organ of the White company is of moment. Among the American college girls who have gone to France to do their share of the reconstruction work in the devastated war zone is Miss Marjorie Leigh Carr, a member of the Smith College unit and a resident of Cleveland, Ohio. Miss Carr and her companions have been driving trucks on the other side of the water for several months, and the following is an abstract from a letter to her mother:

Air Experiences

"The day after we landed at a little town off the coast of Brittany, we loaded the trucks with everything in the world from stove pipes to calico aprons and started for Paris. It took three days and was a beautiful drive through Chartres. Since then we have driven over the same ground many times, but the conditions have been radically changed. It is now a military zone and at every turn we were stopped and made to show permits, photographs, signatures and tell all about ourselves. But this district, instead of being 'La Belle France,' is where some of the hardest fighting has taken place and we passed miles of trenches, acres of barbed wire entanglements and village after village with not a building standing or a person living.

"We have been given eleven villages to reconstruct and we are beginning by having French soldiers assigned to us to help in the rebuilding as much as possible. While we clean up the peasants' hovels and themselves and provide them with work so that they can buy at cost from our supply department, except for medical aid, we shall actually give away as little as possible, for the great danger is of pauperizing the people. We have several cows and a bull, sixty chickens, eighteen pair of rabbits, some pigs and some goats, so you see we do have work to give out as we are starting farming on a good-sized scale.

"The little village of Grecourt where we are now stationed is almost entirely demolished. The inhabitants are living with their stock. They are sick and miserable and dirty beyond anything you can imagine. It is pathetic to see these people—all old women and very young children, no young men at all and only a few young women. All day and through the night we can hear the thunder of the big guns at St. Quentin, which is not more than 15 miles away.

"Our work is divided into four departments; the medical, social service, supply and distribution department and the motor department, which includes our fleet of White trucks. We have two doctors attached to the unit in the medical department and what formerly was a beautiful orangerie is now our dispensary. The girls attached to the social service department visit the sick, work with the children, and perform other similar duties.

"We have opened up a little church which was founded in the eleventh century and has been closed since August, 1914. Fortunately this building was not injured in the retreat.

"We are living in three small baraques put up for us by the French army. There are two rooms to a baraque and three girls to a room. We sleep on army cots between blankets, nothing so dressy as sheets, and the nights are very cold."

Save the Sugar by These Desserts

There is about as much need for the saving of sugar as of wheat and meat, for we are sending hundreds of tons of sugar across the water to our allies, and much of this must come from saving. The United States with its possessions has no shortage of sugar crop, in fact, it has the largest ever produced. But there is a drain such as has never been made before. You can do your part by eating less candy, using less sugar in coffee, tea and chocolate, eating more fruits, nuts, popcorn, honey and syrups. It is good that you remember the wheatless and meatless days and keep them wholly, but it would be well also for you to make use of some of the following recipes sent out by the food administration and help save sugar:

The Recipes

Honey Sauce—One cup honey, ¼ cup water, 1 tbsp. butter substitute, ¼ tsp. salt, ¼ tsp. cinnamon, a dash of nutmeg, juice of a lemon or 2 tbsp. vinegar. Boil together 15 min. The juice of one orange and grated peel may be used instead of lemon and seasoning.

Molasses Sauce—One cup molasses or syrup, 1 tbsp. cornstarch stirred smooth with water, 1 tbsp. butter substitute, ¼ tsp. cinnamon, a pinch of salt, lemon juice or vinegar to taste. Boil all ingredients together 20 min. Hot molasses flavored with ground ginger makes an excellent sauce.

Maple Sauce—To a cup of maple syrup add ¼ cup nut meats chopped fine. Heat and serve with hot rice.

Chocolate Sauce—Add a square of melted chocolate to a cup of hot corn syrup. Season with vanilla.

Fruit Sauce—To a cup of corn syrup add ½ cup chopped raisins or dates. Heat before serving.

Honey-Grape Sauce—Boil together until thick a cup of honey and a cup of grape juice. Apple sauce, prune juice or the juice from canned fruit can be used. Another variation can be made by using a cup of cooked apricots that have been run through a food chopper.

Sugarless Fruit Cake—Half a pound each of nuts, dates, figs, raisins and citron. Put dates, figs and raisins through food chopper. Grate in yellow rind of a lemon and add the juice of the lemon and blend with wooden spoon. Chop nuts fine. Cut citron into very fine strings. Pack closely into an oiled tin, alternating layers of fruit with nuts and citron. Press down closely, and leave at least 24 hr. Keep in closed cake box and slice as needed. Serve in small slices with simple gelatine dessert. This can be cut in strips, rolled in powdered sugar and used as candy.

Prune Conserve—Two dozen prunes, ⅓ lb. raisins, two oranges, ⅓ cup corn syrup, ½ cup water, ¼ cup meats. Dried apricots, peaches or canned plums can be used. Wash and cut prunes in pieces, add chopped raisins and orange pulp and peel cut very fine, add corn syrup and water. Cook slowly until the consistency of marmalade. Add chopped nuts 5 min. before removing from fire.

Carrot Honey—Take 1 pt. grated raw carrot, 2 cups white syrup and 2 lemons. Mix and add grated rind of 1 lemon. Heat slowly and simmer until thick and clear. Turn into scalded jelly glasses and when cold cover with hot paraffin. Serve with cold meat or as sauce for pudding.

Scotch Orange Marmalade—To 2 pt. ground oranges add 2 lb. honey and cook to thick marmalade.

The Readers' Clearing House

Hotchkiss Drive or Torque Arm?

Q—Which is better, the Hotchkiss type of drive for machines, or the regular type, using radius rod and torque arm? For instance, is the latter type safer in view of the fact that were a car using Hotchkiss type to break a spring, nothing would prevent the rear wheels from going out of true?—N. H. R. Broughton, Fresno, Cal.

The use of Hotchkiss drive is confined almost entirely to cars equipped with long flat semi-elliptic rear springs which are usually slung under the rear axle housing in order to bring the driving line in as straight a line as possible. Due to the absence of the torque arm and radius rods the rear springs must be rigidly attached to the rear axle housing, being pivoted at the forward end and shackled at the rear, in order to maintain the rear axle in alignment with the remainder of the chassis. The rear springs must also be strengthened as they take up the driving and braking reactions and this is accomplished by the use of an extra heavy main spring leaf together with stronger spring shackle bolts and hangers. The rear springs are designed with a sufficient factor of safety so that they will not fail when in practical use. The advantage of the Hotchkiss drive is that it simplifies chassis construction by the elimination of radius rods and the torque arm thus reducing the number of parts which are subjected to wear when in actual service. Statistics show that the Hotchkiss drive is gaining in favor as it is now being used on more than half of the American cars.

Details of Frontenac Cars

Q.—What mechanical features make the Frontenac so fast, not having any larger engine than it does?—Esca Forgy, Shamrock, Tex.

The Frontenac racing cars are constructed more extensively of aluminum alloy than any other racing car. These cars tip the scales at the surprising low weight of about 1800 lb. The engine is almost all aluminum—cylinders, pistons, crankcase, intake manifold, camshaft cover, water pump, oil pumps, etc., are made of the metal—but this is not all. The body is an aluminum affair; the main parts of the rear axle are cast from this light material, these being principally the gear housing and brake flanges. Many other details like the clutch cone, pedal brackets, gearcase are of aluminum and last but not least the sod pan which extends underneath the car for its entire length is of this light metal.

TO assist readers in obtaining as a unit all information contained in this department on a certain subject in which they may be most interested, such as ignition, carburetion, etc., MOTOR AGE has inaugurated the segregation of inquiries into classes of allied nature. Questions pertaining to cooling will be answered under that head and so on.

MISCELLANEOUS

N. H. R. Broughton.....Fresno, Cal.
Esca Forgy.....Shamrock, Tex.
W. W. Bissell.....Searing, Iowa
W. W. Hartle.....Los Angeles, Cal.

ENGINES

J. S. Blain.....Oil Center, Cal.
T. J. Hunt.....Dallas, Tex.

EXPERIENCE

H. R. S.....Jackson, Miss.

REBUILDING

T. J. Hunt.....Dallas, Tex.

THE ELECTRIC SYSTEM

A. D. Hunt.....Romeo, Col.
Esca Forgy.....Shamrock, Tex.
Berhow & Olson.....Huxlay, Iowa
Forrest Gregory....Rochester, N. Y.
J. H. Baff.....Rock Island, Ill.
M. Casey.....Pontiac, Mich.
R. E. Howard.....Moore, Okla.

No communication not signed by the writer's name and address will be answered in this department.

Other features which make the Frontenac cars so fast are the weight distribution and general balance. For instance, the location of the gasoline tank is unusual. Two long and narrow reservoirs are hung below the frame and alongside the gearbox and driveshaft on each side. These serve to distribute the weight and put more of it where it belongs at the rear of the car. Putting the tanks low aids materially in lowering the center of gravity.

Chevrolet has also given much attention to cooling the oil. Directly in front of the dash is a 12-gal. reservoir, the entire front of which is provided with copper cooling fins. The sod-pan under the engine and a metal shield below this tank completely trap the inrushing air that comes through the radiator and forces it to pass over these fins in order to get out.

Each cylinder has four valves, the inlet being 2 in. in diameter and the exhaust valves 1¾ in. The reciprocating parts are extremely light and the connecting rods are hollow. The latter are of steel and machined all over and balanced to a nicety.

Has Noisy Gearset

Q.—Is it possible to remove the fourth speed gears from a Jeffery Four 1915 model? This gearset is rather noisy and as the fourth speed is geared up it is practically useless for country driving.—W. W. Bissell, Zearing, Iowa.

It is possible to remove the four speed gear in this car but we do not think that this will help matters any. It is possible that this car has been in service for a long time and the bearings have become worn to such an extent that there is too much play between the gears. Inasmuch as the fourth speed gear on this model is idle except when the car is driven on this speed, it would not make any difference in regard to noise if this gear were removed. Our suggestion would be to remove the gearset from the car and send it to the makers, or have a competent repair man put it in shape.

Cause of Ford Missing

Zearing, Iowa, Editor MOTOR AGE—A rather unusual cause for faulty operation of a Ford came to my notice recently and thought that an account of this might interest the readers of MOTOR AGE and perhaps be of some benefit to some one who has been called upon to solve a like puzzle.

This car was overhauled at a local garage, new camshaft bearings installed, oversized pistons fitted and rod and main bearings tightened. The car was driven a short time after assembling when it developed an intermittent miss that defied the efforts of half a dozen of the best mechanics available in this and nearby towns. The car would climb hills perfectly, making the Mormon Ridge hill, which has a local reputation as being a very hard climb, on high. After trying new timers, coils, carbureter and in fact everything that seemed to have any bearing on the trouble, the car was again taken down.

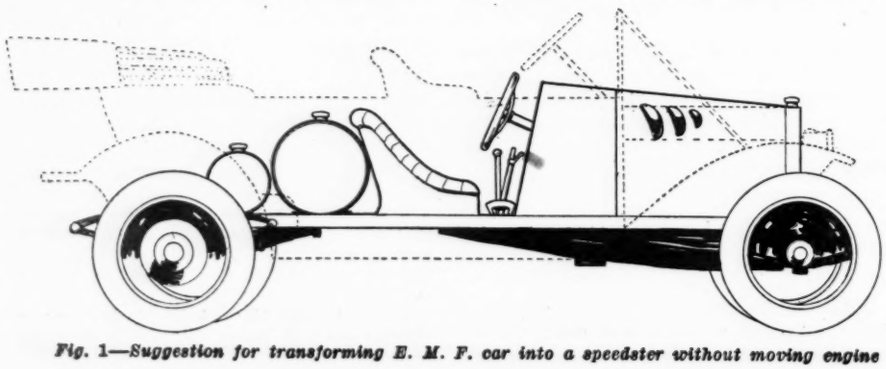


Fig. 1—Suggestion for transforming E. M. F. car into a speedster without moving engine

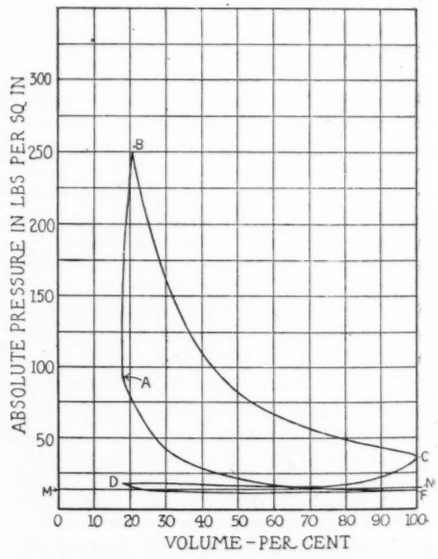


Fig. 2—Indicator diagram for pressure and cooling

The valve stems were slightly worn as well as the valve stem guides, so the guides were reamed out and oversize stems fitted. The cylinder block was also closely inspected for signs of leakage and the intake manifold was also examined closely. The engine was assembled, only to find that the trouble had not been remedied in the least. New timers, spark plugs, etc., were again tried, also another cylinder head substituted with no success. As the owner was loth to dispense of the use of the car it was run for some time in the above condition.

One day he related to a garage man the trouble he was having with the result that a short examination revealed the cause of the missing. The camshaft of the Ford as many readers know is carried on three bearings, the rear one being a plain bronze bearing while the other two are split cast iron bearings held in place in the motor by a set screw through the block, the point of which fits in a groove cut in the bearing. The work of replacing these screws was intrusted to a helper who did not realize the necessity of careful fitting. As the screw in the front bearing failed to seat properly he filed the point away, thereby permitting enough end play in the camshaft to cause the timer roller, which is mounted on the front end of the camshaft, to press against the concave inner surface of the timer, and causing it to fail to make the proper contact necessary to cause a spark in the cylinder. In this case the ignorance of the man who placed the defective set screw in the engine cost the owner quite a sum of money.—W. W. Pissell.

Knock in 1913 Franklin

Q.—My 1913 Franklin 6-38 has a very distinct knock after it has been driven a few miles and when thoroughly warmed up it sounds very much like a valve noise when there is too much clearance between the rocker arm and the valve stem. The car has been overhauled by a mechanic, who claims all the pistons, wrist pins, main and connecting bearings are good fitting. The valves are properly fitted in guides and the adjustment O. K. The crank is also in perfect alignment and the pistons properly squared up. What is your opinion of the probable cause of this knock, which is very prominent at 25 m.p.h., but does not appear at any speed when descending a hill and the engine is running against compression?—W. W. Hartle, Los Angeles, Cal.

It would seem from your description that the knock was due either to a loose main bearing or to an undersize piston. The noise produced by a loose main bearing is rather deep in tone and is most noticeable when the engine is under heavy load. An easy test for this is to run on the road at a speed of around 15 m.p.h. and then apply the service brakes so that there will be a heavy load on the engine. If the main bearings are loose they will knock loudest under these conditions. This might also be true of an undersize piston which would show about the same symptoms as the main bearing except that the knock would sound more metallic and would be located at a higher position than in the case of the main bearing. A piston slap can be isolated by pouring heavy oil, similar to 600 W steam engine oil, in one cylinder at a time and making a test on each cylinder independently. The heavy oil will hold its body long enough to permit of a test and if the knock disappears when the oil is injected into one of the cylinders, it can be assumed that the noise has been confined to one cylinder and that particular piston can be removed and measured to determine if it has not an excessive clearance when the inside dimensions of the cylinder are also taken into consideration.

This noise might also be due to a sticking valve or to excessive play in the timing gears. If the noise is due to timing gears this can be determined by using a wooden stick as a brake on the magneto shaft which will for the time being check the noise and enable one to observe whether or not this may be the cause of the trouble. Providing a valve is sticking one can usually see this by throttling the engine to a low speed and observing the action of the valves. Valves usually stick on account of an excessive accumulation of carbon on the valve stem thus causing it to stick in the guide.

Experience Meeting

What Was Your Experience with

Heated Intake Manifolds?

WITH motorists striving to save fuel for both patriotic and financial reasons, many would like to know whether the special manifolds which are marketed to replace the stock manifolds on Fords and other cars, by which the exhaust heat is used to warm up the intake, have proved worth while in practice.

You who have tried these can help many other readers by telling us how they worked out. In writing, tell the name of the device, concisely, its scheme of operation, how long you used it, what mileage per gallon you were getting before using it, what mileage you got with it, what changes were made in the carbureter adjustment, etc. Also the general effect in the running of the car, as to pulling, starting, acceleration, etc. Also its effect in reducing carbon deposit. How long did it take and what did it cost to install? Are you using it now and if not, why not?

This will be used with your signature or not as you prefer, but in every case the letter must carry full name and address.

Engines

Pressures and Cooling of Large Engines

Q.—Publish a diagram showing the pressure per square inch of an average cylinder at the time of explosion. Show the relative pressure as it continues to the end of the stroke.

2—Is it possible for large gas engines to be cooled successfully by air under forced draft?—J. S. Blain, Oil Center, Cal.

An actual indicator diagram from a three-cylinder engine with a bore of 8 in. and a stroke of 10 in., operating on the Otto cycle, is shown in Fig. 2. The pressures in the cylinder during all of the events comprising the cycle are shown on the vertical scale and the percentage of volume on the horizontal. Note that the pressures are in absolute values and the atmospheric pressure 14.7 lb. per square inch, is represented by the line MN.

The compression stroke commences at F and continues to A, at which point the

The Experience of Another

Manifolds and Double Treads

Jackson, Miss., Editor Motor Age:—I have had a Wilmo manifold on my Model 69 Overland for about a year now. I was getting around 10 to 12 miles per gallon with the old equipment, which was a very large aluminum manifold and a Schebler model L carbureter, but I had a great deal of trouble with slugging or loading under hard pulls, and almost always when I stopped, some gas would condense and run back through the carbureter, often enough to run clear through the pan and make a puddle on the floor. With the Wilmo, and still using the Schebler L carbureter, there is no condensing and back flow, but I get only 1 or 2 miles more to the gallon than before, except under hard pulling, when there is a great improvement over the old manifold.

I find, however, that the engine will load very easily if too rich and knocks if a little too lean. However, if I keep the mixture just right there is lots of pep to the engine.

The car has run about 20,000 miles and the valves are noisy, but there seems to be a knock which is neither valves nor bearings when the mixture is too lean, as stated above. The camshaft has a little end play, $\frac{1}{32}$ in. or so and the timing gear is worn on one side slightly, some of the teeth having the edges rolled over. While there are thus several reasons for mechanical knocks I can not see clearly why it stops if the mixture is made richer.

One thing I can say positively. The Wilmo does not cause the engine to overheat, but I am under the impression that a hot-spot type, or one with less exhaust heating surface, would give better results. I certainly believe that if I ever own another car with carbureter set low, I will have some kind of exhaust heated manifold. Another advantage is that the engine warms up in about one-tenth of the time that it took it to warm up when it did not have this attachment.

I am now using a double treaded casing which I have run nearly 1000 miles. The tread certainly will deliver its guarantee of 2500 miles, but I am afraid of the side walls near the rim. If I could pick my own inner tire and have another tread sewed on, I would not hesitate to invest in double treaded tires, but in this case at least, it was not my own casing that came back to me. All of the parties I have known who used them have had them blow out through the side, that is, when they give out. Some of them deliver their guarantee all right before they go.

Before I got my Wilmo, I had a pet cock in the manifold with a rod through dash to open same and found it very handy to clear the engine when it loaded, but as to steady running, I found it much better to make air as lean as possible at carbureter, the Schebler L having a dash control of air valve spring.—H. R. S.

charge of gas is ignited and the pressure rises instantaneously to B and then expands throughout the power stroke to C where the exhaust period commences and ends at D. The line DF represents the suction or the induction stroke of the engine which you will observe is less than atmospheric pressure. The 18 per cent of volume on the left of the card indicates the amount of volume required for the compression space in the engine cylinder with reference to the total volume of that cylinder. It will be noted from the card that the maximum pressure in this instance is 250 lb. absolute. However, the pressure in some engines, due to the force of the explosion of the charge of gas, is frequently more than 300 lb.

2—We know of no instances where large gas engines have been cooled by air. The objections to this form of cooling especially when the bore and stroke of the engine is unusually large, is that it is impossible to dissipate the heat with sufficient rapidity to prevent the piston and cylinder walls from becoming abnormally hot. The engines that are successfully air cooled have a rather small displacement per cylinder hence the amount of heat to be carried away so that the engine can perform satisfactorily is not large.

Piston Pin Bushings Loose

Q.—I have an E. M. F. 1911 model, which has been annoying me for some time with a peculiar knock. This knock resembles very much the sound you would get by taking two pieces of ½-in. pipe and hitting them together rapidly. It develops only on a hard pull without a load and also while running on level ground at about 25 to 30 m.p.h. I have tried shorting the spark plug, but this fails to assist in locating same. I feel certain that it is not the connecting rod bearings, as I have just had the cylinder blocks off and found the connecting rods all tight. At the same time I cleaned all the carbon and ground the valves. I did notice at the time that I had the engine down that the bushings in the connecting rods on the wrist pin end were not as tight as I think they should be. Is it possible that this would give me the kind of knock described above?—T. J. Hunt, Dallas, Tex.

Loose piston pin bearings would produce a knock like the one you mention and as long as you state that these bushings are loose, we believe you need search no longer for the trouble or cause of the knock. The trouble should be overcome by fitting new bushings.

Rebuilding

E. M. F. Into Speedster

Q.—I am thinking of cutting an E. M. F. car down to something like the one you displayed in one of your recent issues, showing a Buick 37 cut down like a Stutz Bearcat. Give drawing showing what kind of speedster would look best made out of this car. Would it be necessary to set the engine back in the frame?—T. J. Hunt, Dallas, Tex.

A suggestion for cutting this car down into a speedster is shown in Fig. 1. There are, of course, various types of bodies you could fit to this chassis, but we believe for best results with a small outlay of money, the idea herewith presented is best. It does not require a great amount of cutting and fitting and you do not have to move the engine farther back. The latter item is, by the way, a much harder job than might at first be expected.

"Unclaimed Mail"

No communication not signed by the writer's name and address will be answered in this department. The following inquiries will be answered only on the writers completing their identification:

A Reader	Amarillo, Tex.
A Subscriber	Aurora, Ill.
A Reader	Austin, Tex.
A Subscriber	Chicago
H. C. F.	Chicago
A Reader	Collinsville, Okla.
A Motor Age Reader	Chattanooga, Tenn.
A Reader	Cheyenne, Wyo.
A Reader	Chicago
R. A. Y.	Clark, S. D.
J. A. D.	Cincinnati, Ohio
G. J. L.	Clark Grove, Minn.
A Reader	Cleveland, Ohio
A Reader	Cleveland, Ohio
A Reader	Decorah, Iowa
A Subscriber	Delavan, Ill.
A Reader	Duluth, Minn.
S. W. B.	Evansville, Ind.
Stephen F.	Elizabethtown, Ky.
A Subscriber	Fairfield, Wash.
A Subscriber	Ft. Smith, Ark.
X. Y. Z.	Ft. Smith, Ark.
R. H. O.	Geneseo, Ill.
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R. C. K.	Jackson, Mich.
A Reader	Kansas City, Mo.
A Reader	Kansas City, Mo.
A Reader	Kansas City, Mo.
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A Subscriber	Knoxville, Tenn.
A Subscriber	Knoxville, Tenn.
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A Reader	Lincoln, Ill.
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F. McM.	Minneapolis, Minn.
M. M.	Minneapolis, Minn.
P. W. M.	Moorhead, Iowa
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N. C. Bryant	
A Subscriber	
An Old Reader	
A Subscriber and Reader	
Louis D.	
D. McLean	

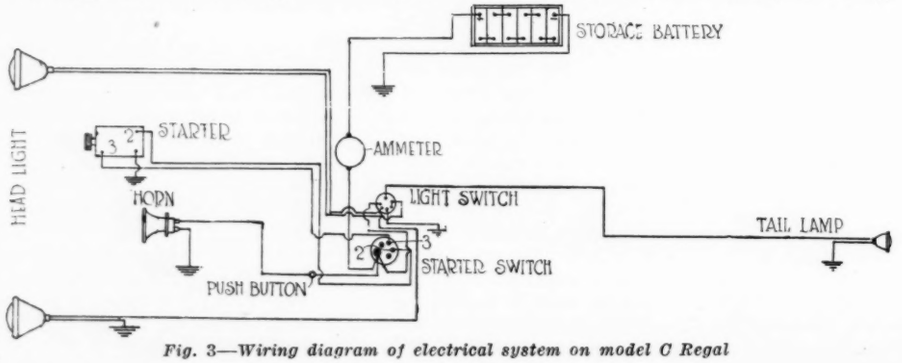


Fig. 3—Wiring diagram of electrical system on model C Regal

The Electric System

Wiring of 1915 Studebaker

Q.—Show the wiring system of the 1915 four-cylinder Studebaker. I particularly wish the parts on the switch shown where the wires enter.—A. D. Hunt, Romeo, Col.

A wiring diagram of this car is shown in Fig. 6.

Medley of Electrical Questions

Q.—What makes ammeter show charge when the car runs below 20 m.p.h. and discharge when same runs above that speed? How should a storage battery be connected up on the car? Should the positive or the negative side be grounded and does this make a difference with different systems? We would like to receive full information on magneto recharging. Can a magneto recharger be hurt by connecting it to a 220-volt alternating-current circuit? What is a good rule to go by in testing out a magneto before and after charging? How should a coil be tested for weakness? How many dry cells should be used to charge a magneto and should the magnets be hammered while on the recharge? Should the current be on the recharger steadily or should it be snapped on and off? What is wrong when the car runs nicely on dry cells and misfires and explodes in the muffler as soon as switched on a low-tension magneto?—Berhow & Olson, Huxley, Iowa.

The only reason that we can give for the ammeter showing charge at low speed and discharge at high speed is that it is connected the wrong way. This should be corrected by reversing the connections. With some types of ammeter it does not make any difference which way they are connected, but others, based on a different principle, must be connected in a particular way.

When a storage battery is removed from the car for any reason and replaced, it is, of course, absolutely necessary, if the ground return wiring system is used, that the same side of the battery be grounded as previously. The Society of Automotive Engineers recommends that in grounded systems the positive side of the battery should be grounded, but, of course, it is quite possible to design systems with the negative side grounded.

Whether a magneto charger can be injured by connecting it to a 220-volt alternating circuit depends entirely upon what voltage the recharger was wound for. Of course, a recharger can be operated successfully only with direct-current. If it had been designed for 220-volt direct-current, it would not be injured by connecting it with alternating circuits of the same voltage for a short period. However, practically all rechargers are of such design that if they are connected to a circuit of the voltage for which they are intended, any great length of time, they will overheat. The circuit should remain closed only for a few seconds, as the magneto attains its full strength almost instantly and leaving the current on longer does no good.

We know of no simple test for a magneto to determine the strength of its magnets except by throttling the engine way down and noting at about what speed the engine begins to miss. If the magneto is very strong the engine can be throttled down further than if the magnetos are weak. The best test for a coil is that of replace-

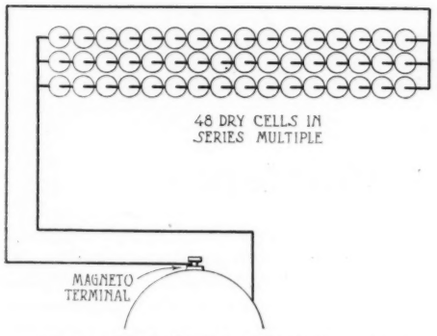


Fig. 4—Dry cells for recharging current

ment. If you suspect a coil to be in bad shape, substitute for it another one of the same type and if that obviates the engine trouble, it shows that a coil is at fault.

If you want to recharge magneto magnets by means of dry cells the number of cells to use depends entirely upon the voltage for which the recharger is wound. In order to recharge the magnets you have to take them off the magneto and apply them to the poles of the recharger. Some people believe that tapping the magnets while the current is on makes them stronger, but whether this is so or not it is difficult to say. At any rate, the current should not be left on for any great length of time as this is apt to hurt the recharger.

Recharging Ford Magnets

Q.—I do not understand your answer to the question as to why a Ford starts hard given in your issue of Dec. 13. Your explanation was that very likely the trouble was caused by weak magnets in magneto, and further on in the answer you give what seemed to me to be the most clear and concise directions for recharging magnets that I have ever read. Your explanation was very plain and to the point. However, on thinking the matter over, I could not figure out one item, viz., where you state: This can be done by connecting six storage batteries to the magneto terminal. Does this mean six regular storage batteries as employed for starting and lighting cars? If so, would not this make a tremendous amount of current to use for this purpose? Also, what is the process of wiring storage batteries in series? Show by diagram how this is done.

2—If six storage batteries were used, would they have to be of the same voltage? Could they vary as to amperage?

3—Could the same result be accomplished by using dry cells? How many would be needed and what wiring should be employed to connect them?

4—Give diagram for above and name of wiring system employed.—Forrest Gregory, Rochester, N. Y.

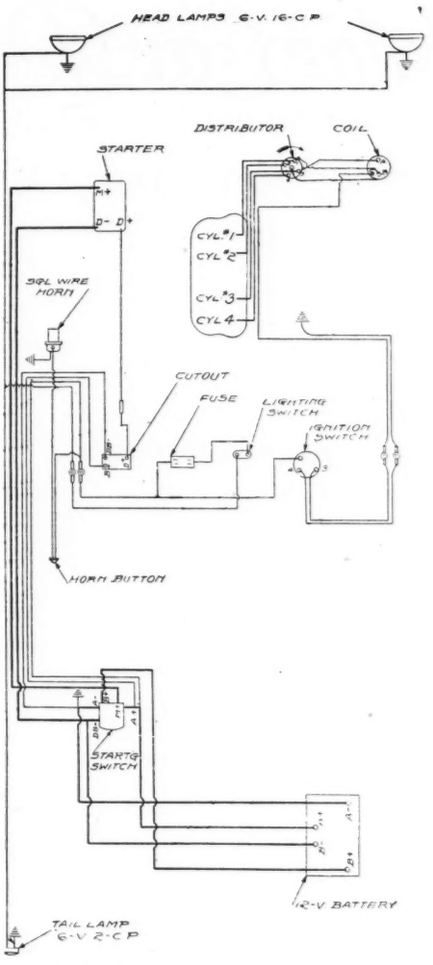


Fig. 7—Wiring diagram used on 1915 Dort roadster

1—Connecting six storage batteries in series means simply taking the six batteries and connecting the positive terminal of one to the negative terminal of another. You would then have left one negative terminal and one positive terminal for connecting to the magneto and frame, the latter a ground connection. Six batteries will not be too many for this purpose, especially if they are in a partially run down condition. Three or four 6-volt batteries fully charged will suffice also. This would give about 18 or 24 volts. The manner of connecting them would be as in Fig. 8. This shows how the batteries are connected in series.

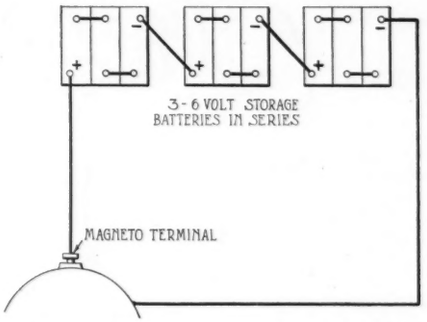


Fig. 8—Series multiple connection of cells

2—The voltage and amperage could vary a little one way or another. There will be no harm done with a little more current, although if the connection is maintained too long the coils will overheat with the result that the insulation would be damaged. The best way is to make and break the ground connection five or six times, leaving the connection closed about a second each time.

3—Yes. Dry cells can be used as a source of recharging current. It will take at least forty-eight of them connected as in Fig. 6. The combination will give about 24 volts and if the cells are fully charged there will be sufficient current for a satisfactory job.

4—A diagram for this is shown in Fig. 8. The manner of connecting them is known as the series-multiple, in which sixteen cells are connected in series. These series are then connected in multiple, as shown.

Electric System for Stearns-Knight

Q.—Show wiring diagram for Stearns-Knight model 1912 for a one-wire system and also how to install a Gray & Davis starter on same.

2—Will the generator on a Stearns-Knight model 1912 be suitable for Gray & Davis starter? —J. H. Baff, Rock Island, Ill.

The advantage to be gained by installing a single wire system for the present lighting system on your car would not warrant the expense involved as the saving in wire would be small. In regard to installing a starting and lighting system this involves considerable machine work as a ring gear must be attached to the flywheel and brackets mounted to hold the starting motor in its proper place. The starting motor and generator in this installation are two separate units.

The lighting generator with which this car was originally equipped has not sufficient capacity to maintain a battery for a complete system such as you refer to and will require the installation of a larger unit.

Wiring of Model C Regal

Q.—Publish wiring diagram of the model C Regal, showing the starter, lights and generator.—R. E. Howard, Moore, Okla.

A diagram of the electrical system as used on this car is shown in Fig. 3.

Wiring Diagram of 1915 Dort

Q.—Publish a wiring diagram of a Dort roadster 1915, model 4.—M. Casey, Pontiac, Mich.

This diagram is shown in Fig. 7.

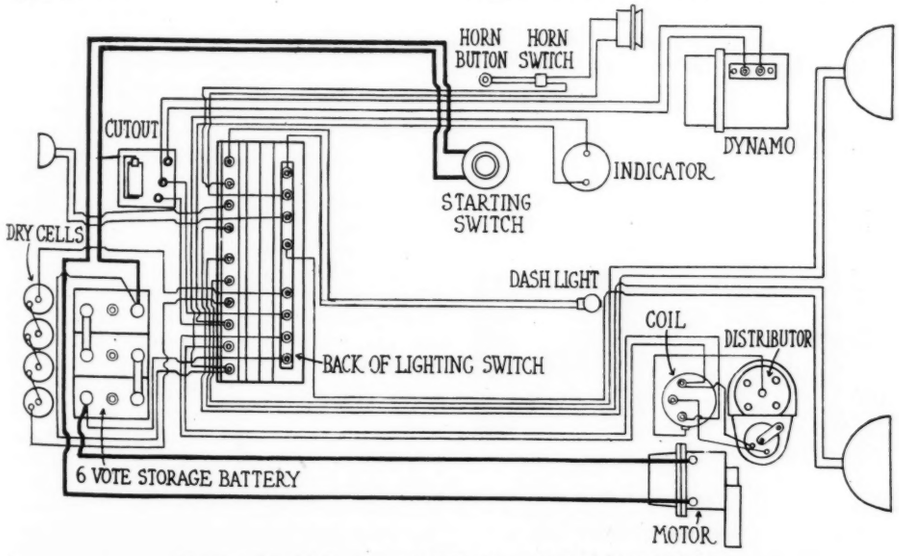
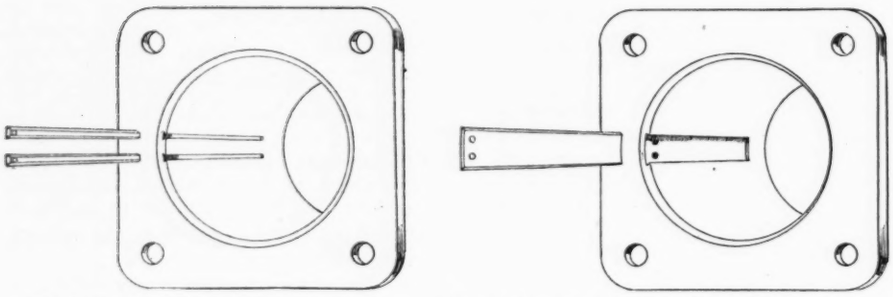


Fig. 6—Wiring diagram of 1915 four-cylinder Studebaker car

The Motor Car Repair Shop

Electrical Connections and Other Pointers



Method of repairing scored cylinders as carried out by one concern. The process consists of fitting chamfered pieces into corresponding slots cut into the walls at the point of score

Electrical Connections

IN making electrical connections it is well worth while to pay particular attention to attaching wires to switch terminals, etc., for if this is not done there will be no end of trouble. The first thing to suspect generally when the ignition or electrical system does not function properly is a loose wire or terminal.

When making an ordinary connection to a terminal be sure to wind the bare end of the wire around the terminal in a clock-wise direction. Then when the screw is tightened up, there is a tendency to turn the wire in a clock-wise direction and with the wire wound in this way it will be wrapped all the tighter around the screw with desirable results. But when the wire is wrapped around the wrong way it has a tendency to back off when the screw is tightened. If space permits a washer should be placed under the screw head and wire so that there will be plenty of surface to hold the wire down firmly and to make a good contact.

Making a Loop End

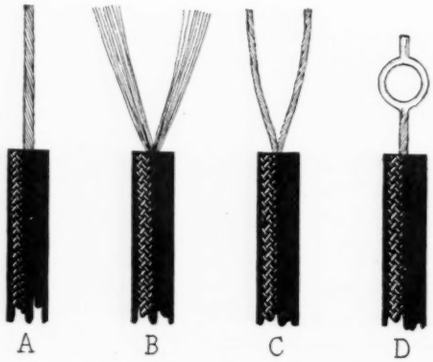
The best way to make a connection of this kind is to put a loop in the end of the wire as shown in illustration. Such a loop can easily be made with wire of the stranded type. The first thing to do is to remove the insulation for about 1 in. as shown at A. Then separate the strands into two equal parts, as indicated by B. Twist each half of the strands similarly to the way they were before being divided. This step is shown in C. Then make a loop of the size desired and beyond this twist the two parts together with a pair of pliers. Dip the looped end thus formed into solder and you have an ideal connection, D. This is a little more trouble than ordinarily, but the added security it gives is well worth while.

When removing the insulation from the wire be careful not to cut any of the small copper strands. They are so fine that it is an easy matter to cut half a dozen of them, if care is not observed. Each strand does its share of work in carrying the current to the lamps or to whatever other part of the electrical system it may be connected. Do not allow wires to hang unsupported on the car. There are on the market rubber insulated staples which are intended for this kind of work and they should always be used to keep the wires snugly up against the woodwork.

A word in regard to soldering connections. Avoid acids for a flux; in time the acid will corrode the joint to such an extent that the contact is broken, resulting often in a mysterious miss in the engine or a disarranged lighting system. There are on the market forms of solder with flux in combination, which are safe to use, or any of the prepared soldering sticks, containing mostly resin, are all right.

Repairing Scored Cylinders

Cleveland, Ohio—Editor MOTOR AGE—Various means have been devised for repairing scored cylinders, such as filling the cuts with different alloys, etc. A method for repairing scored cylinders which we have used for years is shown in the accompanying sketch and consists of fitting metal pieces which have beveled edges, as shown, into a recess cut into the cylinder wall at the point of score. If the scores are quite close together a comparatively wide piece is fitted, inasmuch as all the metal is cut away between the scores. This is shown at the right of the illustration. Small scores are repaired as shown at the left, by fitting narrow strips of metal. The metal pieces are held in place by steel pins at the bottom. The beveled or chamfered edge of the steel pieces and the corresponding inward slant of the recess cut in the cylinder prevents the repair piece from coming out. This is no experiment. We have been doing this same kind of work since 1895 and very few have been unsuccessful. The latter have been cases where the pin had worn through into the water chamber.—W. B. Cobb Machine Works.



Four steps in making loop end: A, insulation removed; B, separating the strands; C, twisting wires into two leads; and, D, the looped end dipped in solder

Care of Silent Chains

One of the items frequently neglected in engine and chassis lubrication is the silent chain which drives the camshaft or generator on some cars. It should be borne in mind that these chains are sets of little bearings which call for oil, the same as any other bearings. They must be kept well lubricated and free from foreign matter, which would wear them unduly. Each joining stud and rivet of the chain must be regarded as a bearing, for several of the little links ranged side by side and end to end make up the chain. Unless suitable oil properly applied is the rule, inefficient and noisy working and rapid wear are inevitable.

Every time the engine is taken down the chain should be cleaned. Soak it in a bath of kerosene and use a stiff wire brush to get out all grit and dirt. When it is clean drain off all the kerosene. The best way to get off all the kerosene is to wash the chain with a solution of hot water in which a little washing soda has been dissolved. Now put the chain in a bath of oil of a moderately heavy grade and let it soak until the lubricant has reached all the points of the bearing surfaces. If necessary heat the oil a trifle to thin it.

How to Lubricate Chain

To lubricate the chain when it is in position, the best way is to put the oil on the inside, as this part comes in direct contact with sprockets. It is convenient to have an oil brush to distribute it along the chain surface. This, of course, applies to chains which are exposed. Where chains are inclosed some means are usually provided for keeping it constantly oiled. Open chains should be oiled every day. This is true particularly where they are running all the time, as in some motor-generator drives.

By all means avoid a hard lubricant on silent chains. It defeats the purpose for which it is applied, since it is practically impossible for it to reach the bearings itself and incidently prevents other lubricants from doing so. By hard lubricants we mean such substances as grease and tallows which have no tendency to flow.

Chevrolet Brings Out Truck

Worm-Drive, 1-ton model at $1.125

THE latest of the passenger car companies to meet the demands from all sides for motor truck models is the Chevrolet Motor Co., which has just brought out a worm-driven 1-tonner selling at $1,125 in the chassis, with an express body at $1,245 and an eight-post top and body at $1,320 f. o. b. Flint, Mich. The wheelbase is 125 in.

The engine has a bore and stroke of 3⅛ by 5¼. The N. A. C. C. horsepower rating is 21.76. The engine is a valve-in-the-head type with a piston displacement of 224.3 cu. in. It is mounted under a conventional hood forward of the dash and is carried on arms extending to each side of the frame. The rear end is carried on two heavy malleable iron castings hot riveted to the frame and held in place by two drop-forged U-bolts. The front is hung in shackles bolted to the motor arms and to two substantial brackets hot riveted to the frame. The cylinders are cast in block and are provided with a removable cylinder head. Lynite pistons with three rings are employed and the crankshaft is carried on three main bearings.

The engine is water cooled by a centrifugal pump circulating the water through a cellular type radiator with a heavy brass core and a pressed steel casing. The radiator is mounted on two V-shaped slotted steel springs bolted to the front cross member and resting on two steel washers.

Carbureter is Zenith

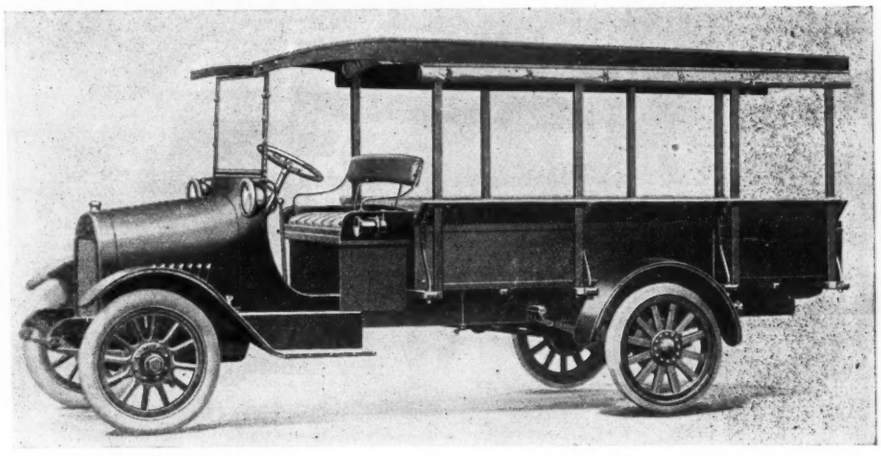
A Zenith carbureter is used with a hot-air-jacketed intake manifold. The carbureter is fed by gravity from a 13-gal. tank located under the driver's seat. All the air enters the carbureter through a combined strangler and temperature regulator which provides a cold air opening during warm weather. A Monarch suction governor is installed between the carbureter and the intake manifold to limit the speed of the truck to 25 m. p. h.

Ignition is by a Remy distributor. An Auto-Lite generator is employed and begins to produce a charging current at a vehicle speed of about 6 m.p.h. The electric starter is also an Auto-Lite product. It is mounted on the rear motor arm and operated through a Bendix drive.

From the engine the drive is taken through a cone clutch with a leather facing and thence to a three-speed selective gearset. The gearset is carried on a frame bolted to the flywheel housing and can be quickly and easily removed, being located directly under the driver's floorboards.

From the gearset the drive is taken through a seamless steel tube propeller shaft with three universal joints to the worm-driven rear axle of which the worm and worm gear are made by the Cleveland Worm & Gear Co. The rear axle housings are of malleable iron and the axle shafts are of the semi-floating type.

Hotchkiss drive is employed, both the torque and propulsion being taken through the springs. Two separate sets of brakes of the internal expanding type are located on the rear wheels. Each brake shoe is 14 in. diameter and 2 in. wide.



New Chevrolet worm-drive, 1-ton truck, which sells at $1,125

The frame is of open-hearth rolled steel channel 4 in. deep and is provided with three cross members. The wheels are of the artillery type and have twelve hickory spokes, front and rear. Tires are 31 by 4 pneumatics, front, and 32 by 4, solid, rear. The front wheels are fitted with Timken roller bearings and are provided with malleable iron hubs with flanges of pressed steel. For greater speed, pneumatic tires are employed in front and solids in the rear. Left steer and center control are employed.

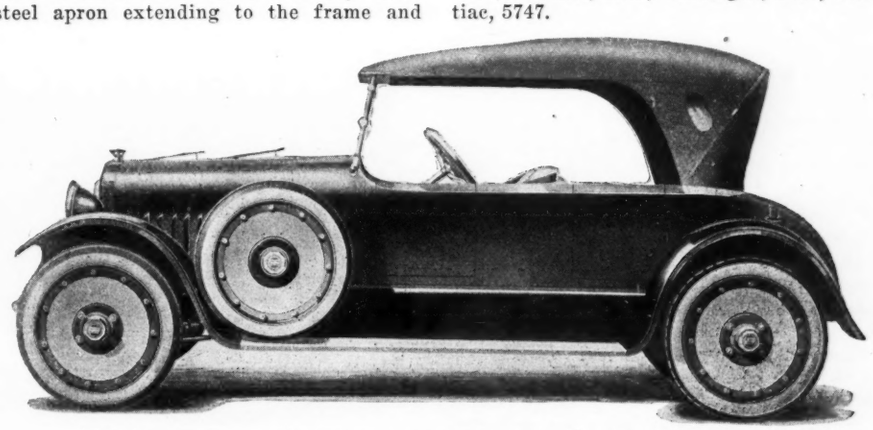
The engine hood is of heavy sheet steel with three hinged rods. An anti-squeak is used on both ends of the hood to prevent rattling and the sides each have seven louvres for better air circulation. The cowl is also of heavy sheet steel riveted in place and carrying the instrument board on which are mounted the speedometer, carbureter choke, ammeter, oil pressure gage and the lighting and ignition switch. Passenger type front and rear fenders are used. They are of pressed steel in one piece and are crowned and attached to the frame side members by a heavy pressed steel V-section iron with a heavy sheet steel apron extending to the frame and completely enclosing the sides and protecting the running board from mud and water.

ERD MOTOR EXPANDS

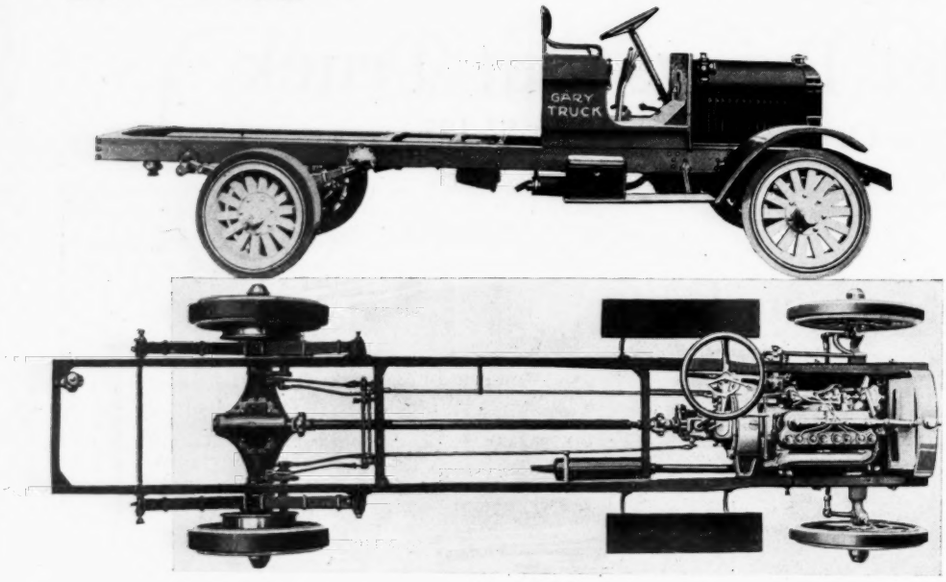
Saginaw, Mich., Jan. 18—The Erd Motor Co., manufacturer of a kerosene-burning engine for tractors, has increased its capitalization from $150,000 to $300,000 and will build an addition 90 by 240 ft. to care for increased production. The present daily output is about six engines, and it is expected to increase this to fifty per day. This will require an increase in the number of employees from 125 to about 500. It is expected that the new plant will be ready sometime in March and contracts already closed for 1918 total 1,803,625 with a further contract pending. A new 60-hp. engine is being developed and will be placed on the market sometime next fall.

HALF WORK FOR MOTOR CAR

Detroit, Jan. 18—The report by the Michigan Labor Commission shows that the motor industry employs practically 50 per cent of the industrial employees in the six largest Michigan cities. Detroit, alone, employs 118,489; Flint, 18,262; Lansing, 7875; Jackson, 4683; Muskegon, 2847; Pontiac, 5747.



HAL military model, given a war-like appearance by its disk wheels



Above is the model K 3-ton Gary truck and the worm-drive chassis

Gary Truck Concentrates

Emphasizes Three Larger Capacities of its Five Models

THE Gary Motor Truck Co., Gary, Ind., is concentrating on the three larger of its five worm-drive models, those with 2-, 2½- and 3-ton capacities. Standard parts, such as Buda engine, Sheldon axle, Tuthill springs, Eisemann magneto, Fuller transmission, Lavigne steering gear, Blood Brothers universal and Parish & Bingham frame are used. The engine in the 2- and 2½-ton has a bore and stroke of 4¼ by 5½. The gearset is in unit with the engine, and speed is limited by a governor to 15 m.p.h. The 3-tonner differs here in that it has a bore and stroke 4½ by 6, the gearset is located amidships and the speed is limited by a duplex governor to 12 m.p.h. and 1200 r.p.m.

Lubrication throughout is by geared pump. Cooling in all is by centrifugal pump, and the radiator is mounted on springs to relieve road shocks and strains. An Eisemann high-tension magneto is used. Fuel is taken through a Stromberg carbureter with hot-air attachment.

A Raybestos-faced dry-disk clutch is fitted to all models. The 2- and 2½-ton models have a three-speed gearset; the 3-ton, four. In the 3-ton the gear ratio is 4.99 to 1 in first, 3.16 to 1 in second, 1.79 to 1 in third and 1 to 1 in fourth, while the gear ratio in the rear axle worm is 8.75 to 1. This gives a low-speed gear reduction between the engine and road wheels of 43.66 to 1.

The semi-floating type of rear axle is used with an L-beam axle in front with nickel steel spindles which have large ball thrust bearings between axle yoke and spindle head. Both service and emergency brakes are internal expanding. Those on the lighter models are 2¼ in. and operate inside an 18-in. drum, while those on the 3-ton are 2½ in. operating in a 20-in. drum. Springs are semi-elliptic all around. The 2-ton springs in front are 2½ by 40 in. with nine leaves and 3 by 54 in. with twelve leaves in the rear. The 2½-ton are 2¼ by 40 Titanic eleven-leaf, front, and 3 by 55, thirteen-leaf, rear. The 3-ton has 3 by 44 Titanic ten-leaf front and 3½ by 56, fourteen-leaf, rear. The frame of the two lighter models is 6-in. channel and on the 3-ton, 7-in.

Sewell cushion wheels are extra and tire equipment consists of, on the 2-ton, Goodyear S. V. or Goodrich, 36 by 4 in front and 36 by 6 rear; 2½-ton, Goodrich 36 by 4 in front and 36 by 7 in rear; 3-ton, Goodyear S. V. or Goodrich, 36 by 5 in front and 36 by 5, dual, rear.

Steering gear is irreversible worm and split nut type, a 20-in. wheel being fitted to the two lighter models and a 22-in. wheel to the 3-ton. Equipment includes open driver's seat, side and tail lights, tools, etc., and the 2½-ton and 3-ton models are fitted with Buell whistles. A special Vesta electric lighting system including generator, battery, two headlamps with dimmers, tail lamp and gage lamp on dash is furnished if desired. Special bodies also are fitted.

This line of trucks, under the name Denmo, was one of the first to include a successful electric starting and lighting system. This was made possible by the insertion of a spring cradle to carry the battery and protect it against the severe jarring and vibration it otherwise would receive. Electric starting and lighting with spring cradle battery suspension; straight line drive, transmission-driven governor, cushioned radiator carrier and complete equipment are the features of the line. The models are alike in the following specifications: Dixie high-tension magneto ignition, Bijur two-unit starting and lighting equipment, Grant-Lees transmission and Pullman car type frame.

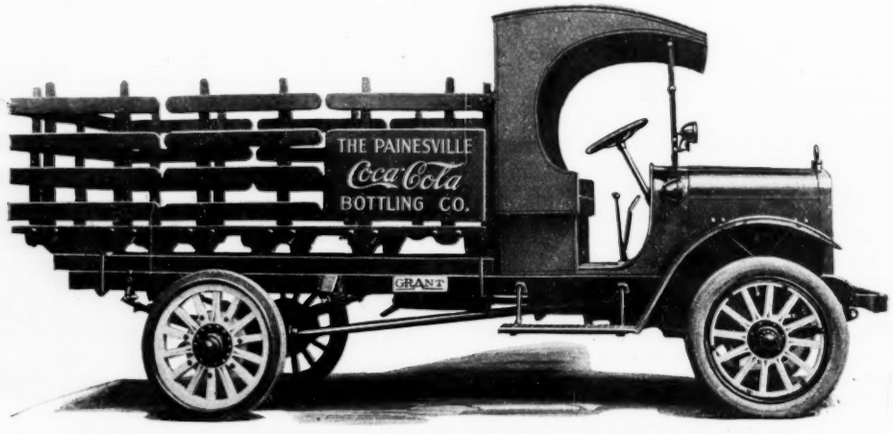
The 1800-lb. truck has a loading space back of the driver's seat of 7 ft., is fitted with Goodrich steel felloe type wheels with 32 by 4 pneumatics front and rear, has a four-cylinder engine of 35 hp. with 3¾ by 5 bore and stroke and sells for $1,020 with flareboard express body and canopy top with curtains or $1,065 with panel body.

The 1½- and 2-ton trucks have loading space of 9 ft. back of the driver's seat, while with the longer wheelbase the loading space is 11 ft. Both have steel felloe front wheels with pneumatic tires 32 by 4½ as standard equipment but are supplied with 34 by 3½ solid at option. Rear tires are 34 by 4 solid. The engine is a 35-hp. four-cylinder with bore and stroke of 3¾ by 5. A Moto-Meter is included in the equipment. The 1½-ton sells at $1,490 with a wheelbase of 124 in. and at $1,585 with a wheelbase of 140 in., while the 2-ton sells at $1,790 with a 124-in. wheelbase and $1,885 with a 135-in. wheelbase. These prices are for chassis only.

All models have combined force feed and splash lubrication and unusually large Fedders cellular type radiator and thermo-syphon system. The equipment includes complete instrument board with speedometer, ammeter, lighting switch, ignition switch, oil gage, carbureter choke, front bumpers, head and tail lights, rain vision, windshield, horn, tools, pump, spare rim and spotlight.

Denmo Trucks Are Now Grant Trucks

THE Grant trucks are really a continuation of the Denmo line formerly manufactured by the Deneen Motor Co., Cleveland, Ohio, before its purchase by the Grant Motor Car Corp. two or three months ago, but will be produced on a larger scale than formerly. The models include an 1800-lb., 1½-ton and 2-ton truck with two additional models of the same capacity as the last two but with longer wheelbase and loading space.



One of the Grant line of trucks, a continuation of the Denmo line

Henney Ford 1-Ton Line

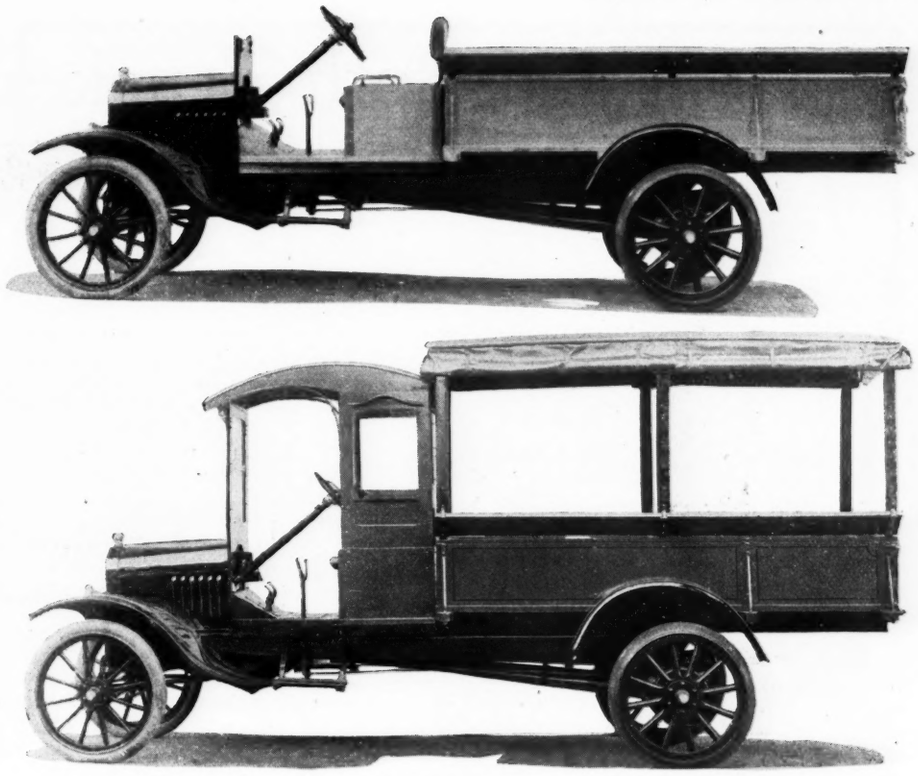
Offers Standardized Bodies with Interchangeable Parts as Stock

INTERCHANGEABILITY features the standardized truck bodies for the Ford 1-ton chassis added to the 1918 line of the Henney Buggy Branch of the Moline Plow Co., Moline, Ill. The bodies are furnished in several different types and include a fully inclosed steel panel body, a platform and stake body and a complete series of express bodies, from the simple open flare-board type to an express body fitted complete with a canopy top and all -season driver's cab.

The units entering into the different body types are so standardized that one may be fitted to the other to form the various types without special alteration. The all-season driver's cab can be fitted thus to any type of body, while the canopy top can be added to any open express body with a trim-looking finished product.

The construction of the Henney bodies is of selected kiln-dried hardwood, unusually well ironed and reinforced with forgings. Finish is by the hand methods that have been used in the Henney plants for fifty years. Attachment of a Henney body to a Ford chassis consists of tightening several bolts provided for the purpose. Each unit has special provisions for quick attachment.

The standard line of commercial bodies for the Ford model T chassis will be continued without change. It was in this line that the Henney features of standardization and interchangeability first were developed.



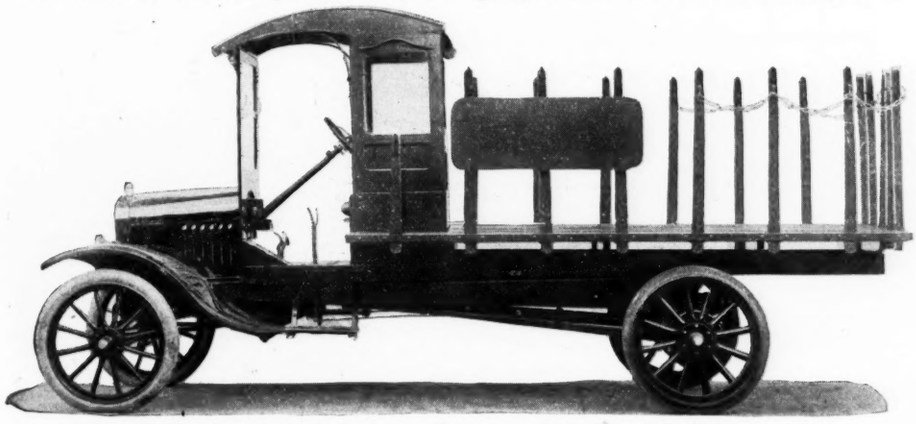
The Henney without cab or canopy top and with these added

COAST AWAITS CARS

Los Angeles, Jan. 18—Southern California dealers are optimistic over the prospects for 1918. The transportation problem is the only one causing uneasiness. Some dealers have been entirely without cars for three weeks and the factories give them no encouragement. To all requests the reply is made that the manufacturers cannot get railroad cars in which to make the long shipment. At various points in the country between the factories and Los Angeles are stored cars that were destined for local consumption. They were taken from the freight cars in order that they might be used for other purposes, according to explanations received here.

Tourists have been liberal buyers of passenger cars here during the winter months, but the number of the visitors who will come this year is more problematical than ever. Statements have been issued by railroad traffic managers that the tourist trade will not suffer but hotel men say if this is so the visitors are exceptionally late coming this season. None of the big hostelries has had the rush for accommodations customary to this time of the year.

There is a feeling among the trade that dealers handling old, well established lines of cars will enjoy a conservative business, although probably not so many cars will be sold. The public will be keener and more discriminatory buyers than ever before during 1918 and it is the representative of the new make of car such as would create a certain demand in itself, because of the novelty, that will have to watch both sides of the ledger. Buyers are not going to take well to uncertainties, in the opinion of the men here most experienced in the business.



Henney stake body, one of many styles offered in its line

CANADA SEES TROUBLE AHEAD

Montreal, Can., Jan. 18—It having been reported throughout the trade in Canada that the government proposes to restrict the importation of gasoline and motor cars, dealers are planning to lay facts before the government to prove that such action would be harmful to the dominion. The Montreal Automobile Trade Association through its manager, T. B. Kirby, is gathering information and it is probable that a meeting of the trade will be held at an early date.

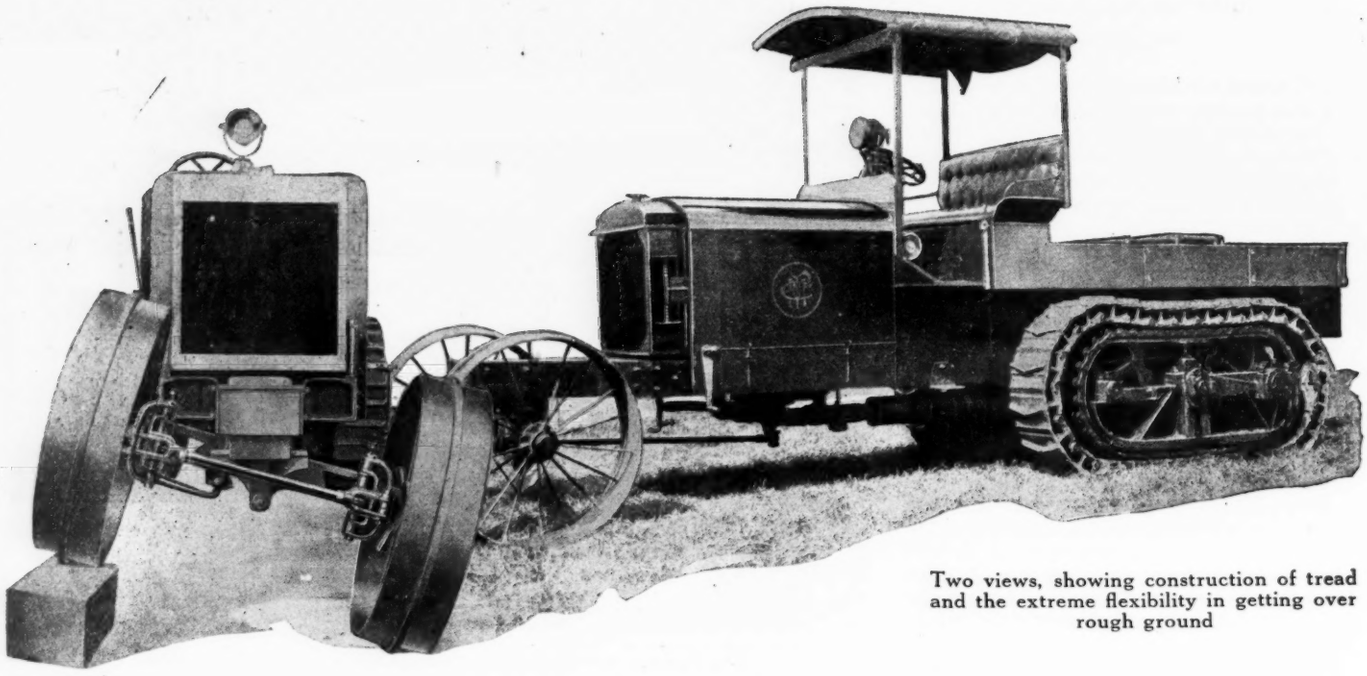
A. A. A. CERTIFIES STOCK MAXWELL

Detroit, Jan. 18—The stock nature of the Maxwell 1-ton truck, which completed in New York a successful run of 2500 miles from New York to Jacksonville, Fla., and return, recently was certified by the American Automobile Association. A stock certificate plate has been issued for the truck and henceforth will adorn the instrument board of the record maker. The drive was made under rigid schedule, and the official and final report is made to further substantiate the truck's claim to durability and upkeep economy

EMPIRE CARS UNAFFECTED BY FIRE

Indianapolis, Ind., Jan. 22—There will be no interruption in the production of Empire cars on account of the recent fire which destroyed about 300 finished Empire cars stored in the Industrial building. The warehouse is remote from the factory and the latter was therefore not affected. The Empire company has doubled its factory force and beginning Jan. 14 the production schedule was materially increased.

Centiped Both Truck and Tractor



Two views, showing construction of tread and the extreme flexibility in getting over rough ground

THE Phoenix Mfg. Co., Eau Claire, Wis., is producing a combination motor truck and tractor called the Centiped. It is designed primarily for trucking over ordinary country roads and for plowing and grading, hauling and so on. The powerplant consists of a 5½ by 7-in. four-cylinder engine that develops 50 hp. brake test at 700 revolutions. The engine has a double ignition system, and two gasoline tanks are furnished, one with 20-gal. capacity under the seat, one in the rear of 40-gal. capacity. Fuel is taken from the rear tank to the front tank by a hand pump. Lubrication is by constant-level splash system.

The Centiped is handled and controlled as an ordinary motor truck, has three speeds forward, 1½, 3 and 5½ m.p.h. and reverse. Transmission and differential gears are of special heat-treated steel housed in an oil-tight case. A heavy spring drawbar is fitted for connection to wagons or sleds which can be handled in trains.

Construction of Wheels

The wheels are special features. The outer belt, or tread chain, is made up of return, recently was certified by the Amerand bushings, and operates successfully in mud or sand roads. All working parts are 6 in. above ground. In regular work a consumption of 2 gal. of gasoline an hour is claimed; crankcase oil, ¾ gal. in 10 hr.; and 2 gal. cheap black oil a day on traction wheels. For severe service in dry and sandy roads, a pound of hard grease is used in the grease cups in addition.

The tread chains on the machine are 12 in. wide and have a 5-in. bearing surface, or 10 sq. ft. under each machine. The chains can be made any width desired for heavier machines. The rolls in the roller chains are 3 in. in diameter and hardened by the company's own process. The bearings on the wheels are housed and as nearly dust-proof as possible. Wheels oscillate on the shaft and are independent of one another, adapting themselves to inequalities in the road. Less wearing parts are claimed for this wheel than for any other of similar character. The body box carried on the truck is for supplies and tools necessary for the operation of the tractor and train.

LAWSON MILITARY TRACTOR

One of the chief points of the Lawson military tractor airplane is its ability to fly very slow as well as running at high speed when necessary. The machine is of the primary training type and built according to government specifications by the Lawson Aircraft Corp., Green Bay, Wis.

The engine is a Hall-Scott, 100 hp. and drives an 8 ft. propeller 1400 r.p.m. The pitch of the propeller is 5 ft. 8 in. The engine has a bore and stroke of 5¼ by 7 in. and weighs without propeller, 410 lbs. It has a fuel consumption of 8.5 gal., while the oil consumption is 0.5 gal.

The Lawson machine has dual stick control. There are many features which cannot be made public and one of these is the machine's inherent hovering ability, which makes it suitable for reconnaissance work. Some of the important dimensions of the Lawson tractor are as follows: Span of upper wings, 44 ft., 6 in.; span of lower wings, 32 ft., 6 in.; length overall, 25 ft.

One of the Dart 1, 2 and 3½-tonners, which are offered for 1918

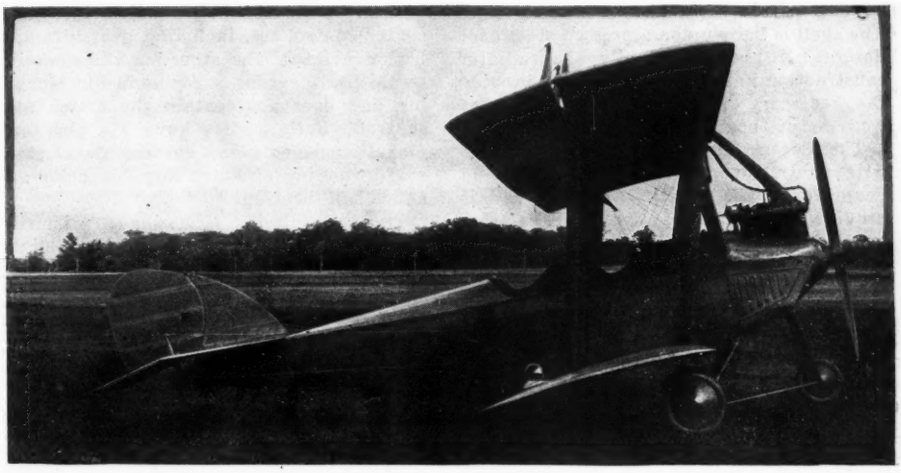
6 in.; height, 10 ft.; weight empty, 1300 lb.; weight loaded, 1900 lb.; useful load, pilot and passenger, 350 lb.; gasoline, 175 lb.; oil, 25 lb.; accessories, 50 lb.; loading per horsepower, 19 lb.; speed range, 37-66 m.p.h.; climb in 10 min., 2600 ft.; gliding angle, loaded, 1 in 8.

Three Dart Models

THE Dart Motor Truck Co., Waterloo, Iowa, will produce three models for 1918, 1-, 2- and 3½-ton. Each model varies only in respect to the different capacities. The line is fitted throughout with Buda engine, dry-plate clutch, final Timken worm-drive, chrome vanadium springs and Hotchkiss drive.

The 2-ton model has a four-cylinder engine cast in block with pressure lubrication. The bore is 4¼ and the stroke 5½, while the engine develops 40 hp. at 1200 r.p.m. The axles are all Timken-Detroit with Timken taper roller bearings. The rear axles are new, one-piece housing, eliminating any possibility of oil leakage. The brakes are duplex internal-expanding of extra large size. The radiator is cast-tank type with honeycomb core. On the 3½-ton model the core is divided into seven separate sections, each having its opening in the top and bottom tanks and each held in place by bolts and plugs holding the section rigidly in place but allowing removal in case of injury. A section can be removed and repaired without laying up the truck.

Water circulation in the two large trucks is by centrifugal pump; in the 1-ton, by thermo-syphon system. A Master carbureter is used throughout, and fuel feed is by gravity from tanks under the seat except in the 1-ton, where the Stewart vacuum system is used.



Lawson military tractor, which is of the primary training type

High-tension magnetos are used, and electric lighting and starting are optional at extra cost. The transmission is mounted in unit with the engine on the 1- and 2-ton models, and amidships on the 3½-ton. Transmission is four-speed in the two larger. Both torque and propulsion are taken through the rear springs, which are of chrome vanadium steel and have three-point suspension at the driving end. Springs are semi-elliptic chrome vanadium steel heavily shackled at the rear end. Left hand steering and center control are employed. Artillery wood wheels are stock with steel optional on the two larger. The 3½-ton is supplied in several wheelbases.

Standard equipment otherwise includes large size single tires with dual tires optional, side and tail lamps, tool set and jack. Prices are, 1-ton, $1,850; 2-ton, $2,470; 3½-ton, $3,400.

Mercury to Be Semi-Custom Product

Purchaser to Select Color and Style

THE Mercury car, produced by the Mercury Cars, Inc., Hollis, L. I., is a semi-custom proposition in which the bodies are intended to suit the taste of the purchaser in color and style, while the chassis is stock. The price, naturally, will vary with the body selected, but the four-passenger, which is practically a stock model, will sell for $2,950. An illustration of this car was given in the issue of Jan. 10.

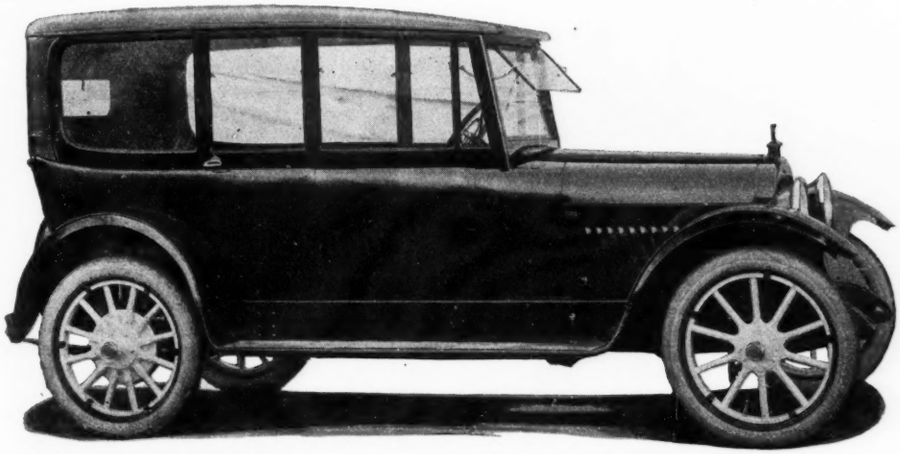
The Mercury has a 114-in. wheelbase with 31 by 4-in. tires, giving an average length with the small wheels which fit into the present body design. Frame construction is 4½-in. channel tapering uniformly from front to rear. The width in the rear allows the weight of the body to be carried close to the wheels. Three pressed steel cross members are provided, the front member having a deep drop to support the forward end of the engine. The rear cross member is below the side rails to make room for the special mounting provided in some of the body styles for the spare tire. Back of this pressing is a tubular cross member, and the gasoline tank is suspended between the two.

The springs are located directly beneath the frame side rails and are 2 in. wide, the lengths being front and rear 36 and 52 in. with the rear underslung. The springs are designed to be practically flat under load and are of chrome vanadium steel. Hotchkiss drive is employed, and the spring eyes and bolts are provided with self-lubricating bushings, eliminating several grease cups. There are seven grease cups on the chassis.

The Weidley four-cylinder engine is used with a unit powerplant mounted with three-point suspension. The front spigot bearing rests in a pillow block bolted on the front cross member by a long U bolt and is provided with a self-lubricated bushing of impregnated wood. The two rear supports are cast on the bell housing in the forms of arms which are bolted to the frame side members. The Weidley four is an overhead valve unit with removable head. The cylinder dimensions are 3½ by 5½.

Elliptic section connecting rods are used and at the lower ends are four bolts. The crankshaft has three bearings and is a counterbalanced type drill for pressure oiling. The camshaft is driven through helical gears actuating the overhead rocker mechanism and the valves, which have 1⅞ diameter in the clear.

A feature of the engine is the unit casting employed for the cylinder block, which also includes the intake manifold. The carbureter connections need not be disturbed with this arrangement when the cylinder head is removed. The exhaust manifold is provided with integral cooling fins. The extension of the pump shaft carries the fan, which is driven by a V belt. The radiator is a removable core type with 5 gal. capacity, supported on a large sheet



New Lexington convertible sedan which is listed to sell at $1,785

of cork within a shell of patented design. The shell is built up on a pressed steel base designed to support rigidly the radiator construction and at the same time provide the necessary flexibility to take care of weaving of the frame.

The electric system is a two-unit Delco with flange supported starting motor and generator. The starting engagement is provided by a Bendix gear drive. Carburetion is by the new Stromberg type M instrument, and oiling is by a full pressure-feed system through a hollow shaft. The drive is taken through a dry multiple-disk clutch faced with Raybestos, a three-speed g arset and a three-quarter floating spiral bevel rear axle with annular ball bearings throughout. There is only one set of brakes on the rear wheels, the service brake being a transmission unit of the external contracting type acting on an 8¼ in. drum mounted on the front universal joint. Adjustment of this is made easy by locating the thumb nut which controls it beneath a small trap door in the front floorboard through which the driver can control the application without leaving his seat. The rear brake connection consists of a single cable, and the removal of several usual brake linkages have resulted in an exceptionally clean chassis.

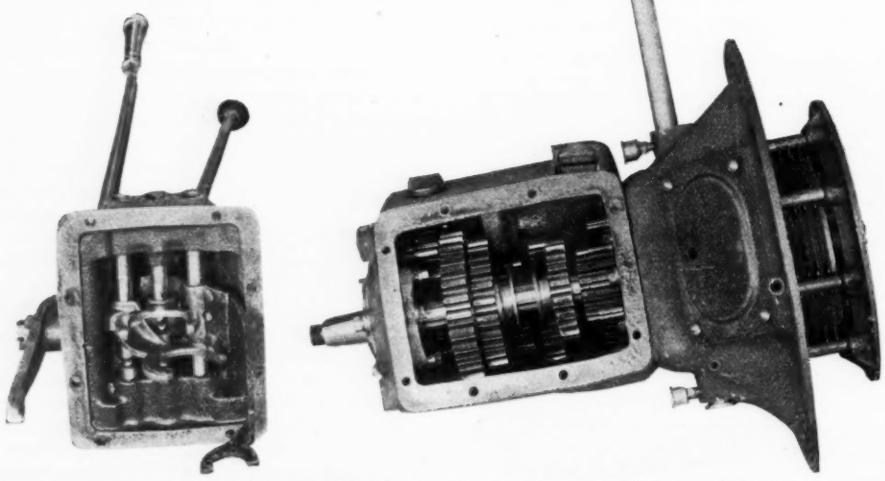
Second Trap Door

Another feature of accessibility is the use of a second trap door providing access to the storage battery, which is situated beside the gearset on the side opposite from the exhaust pipe. The gasoline tank is of pressed steel with 16-gal. capacity fitted with a 2-gal. reserve for emergency. Standard fittings on the car are a Boyce Moto-Meter, oil pressure gage, ammeter, eight-day clock, magnetic gasoline gage, Van Sicklen speedmeter, combination lighting and ignition switch with Yale lock on hood and on dash compartment, all operated by a master key.

HEAVY SERVICE TRANSMISSION

A new four-speed and reverse sliding gear transmission, with direct drive on fourth, has been brought out by Fuller & Sons Mfg. Co., Kalamazoo, Mich. The transmission is built in two types, known as models GU and G. The former is built for a standard unit powerplant, complete with dry-plate and multiple-disk clutch and center control set, including gearshift and brake reverse. The other has the same internal parts except is for amidship mounting and does not contain the clutch and control. Both models have 3½ per cent nickel steel gears and chrome nickel steel shafts running on extra large capacity annular ball bearings.

The transmission is designed primarily for motor trucks with 2 or 3 tons nominal rating, but it is also suitable for extra large passenger cars. The new design incorporates many improvements over the older Fuller transmissions and is built with the same high standard of workmanship.



Two views of new Fuller heavy-service, four-speed transmission

Manufacturers' Communications

SUGGESTS HEAVIER FUELS

HARVEY, Ill.—Editor MOTOR AGE—Now that the drain on the gasoline supply has reached such tremendous proportions, attention naturally is drawn to the question as to how soon we shall be forced to face the problem of using heavier fuels than gasoline in our internal combustion engines of all types. Recent export figures seem to indicate that during the months of March to October, 1917, inclusive, 263,380,868 gal. of gasoline and approximately 187,000,000 gal. of lubricating oils were exported.

While these figures are enormous they do not by any means signify a shortage in the usual sense of the word. There is, perhaps, no apparent shortage either in crude oil or finished product, such as gasoline; there is, however, shortage of means of transportation for finished product to its many markets.

Gasoline, owing to its nature, requires that it be shipped in steel tanks to avoid leakage and consequent danger, and since there is a scarcity of tankage available for domestic business in addition to export business in excess of what the pipe lines can carry, the supply in any one place naturally is limited. While it is perhaps true that no one in this country is suffering because of the lack of gasoline, there may be localities where supplies run out due to transportation difficulties, but if this is so it is not generally known. The fact remains, however, that these supplies are not overly great at any distributing point, and until pipe lines are laid to the principal distributing centers, this condition seems likely to continue.

This forces us to look to other grades of fuel oils, principally because the heavier grades are not so inflammable and can safely be transported in wood barrels under Interstate Commerce ruling. Another very good reason is that of lower price, which, after all, is perhaps the greatest inducement.

When speaking of heavy fuels in the motor car world, the mind reverts to kerosene, that being the next and only fuel oil with which the general public is at present acquainted. The price of kerosene, however, is quite high, considering the demand, the value and especially so as it is practically a by-product in the refining of oils and has no market at present in th sense that gasoline has.

To get a still more economical basis of operation, especially in trucks and tractors, where mileage is low considering engine speeds, we must side-track kerosene as sold to-day, if possible, and get down to a still lower distillate ranging between 30 to 40 deg. Baumè, depending on whether it is from the Pennsylvania, Mid-Continental, Mexican or other fields.

This distillate is very heavy and contains all the heavy kerosene and practically the balance of the cut down to the lubricating distillate. After being cleaned up this distillate is not water white, but that would not hinder its use as fuel, if handled properly.

Would Go Long Way

Owing to its being heavy in hydrocarbons a small volume if properly turned into gas, would go a long way; at the same time, if used in the ordinary carbureter, it would feed at such a rate that sufficient air could not be obtained to make a good mixture, even if only a part were gasified.

Therefore in addition to adjusting the needle valve or size of jet to get more economy, it would seem essential to have a greater air supply and the addition of water vapor, this latter being readily available in trucks or tractors from the chamber in top of radiator.

The use of water vapor would permit clean burning of a large percentage of heavier hydrocarbons, due to freezing of necessary oxygen and its amalgamation with unsaturated molecules and thorough mixture with the gases, but an excess of water vapor would be quite as bad, so far as power is concerned, as would a lack of it.

The whole question then resolves itself into one of gasifying the fluid used to the point where it will not condense on the cylinder walls and thus affect the quality of the lubricant used. This, we believe, will be accomplished by painstaking study of the problem and the public, whose cost of living has been materially increased as the cost of gasoline goes up, undoubtedly would appreciate the attainment of this very desirable end.—Lon R. Smith, sales manager, Buda Co.

Among the Makers and Dealers

TO Make Tractor-Plow—The World Harvester Corp., New York, has been formed with $1,500,000 capital to manufacture a two-wheeled, one-man farm tractor and plow combined.

Detroit Body to Increase Capacity—The Detroit Weatherproof Body Co. will equip with machinery the large building now used for storage and will increase its production to 250 tops a day. About 400 men are employed.

Hall With Fisher Starter—Nelson Hall has been appointed production engineer of the Fisher Electrical Works, manufacturers of Fisher starters for Ford cars. A school for instructing agents and dealers in the installation of Fisher starters on Ford cars will be organized.

Maxwell Ships Parts Overland—The Maxwell Motor Co. started ten trucks overland for the Pittsburgh dealer last week loaded with the largest supply of parts ever shipped to one dealer. The Maxwell company plans to continue driveways at the rate of 100 cars a day from now on.

Four-Drive Tractor Adds—The Four-Drive Tractor Co., Big Rapids, Mich., is planning to erect an addition to cost $8,000 to care for bigger production. Later $20,000 worth of additional stock may be issued. Shipments are being made regularly, a carload being sent to Stuttgart, Ark.

McMullen Succeeds Collins at Chevrolet—J. S. Collins has resigned as sales and advertising manager of the Chevrolet Motor Co. No announcement has been made as to his future connections and it is expected he will take a rest for about two months. E. J. McMullen succeeds Mr. Collins.

Union Truck Sales Organized—The Union Motor Truck Sales Co. has been organized at Bay City, Mich., with a capital of $10,000, the stockholders being also the stockholders in the Union Truck Co. The new company will have charge of the sales of all Union trucks with an office and warehouse in Chicago. The officers are: President, L. W. Hine; vice-president, H. E. Buck; secretary-treasurer, George Beaulieur.

Marmon Plant Continues to Add—Plans are nearing completion for the enlarging of the plant of Nordyke & Marmon on a large scale. Nearly $400,000 is to be expended in new building, and approximately $1,500,000 in new machinery. Although the company is continuing the manufacture of Marmon cars and milling machinery on a large scale, its energies are exerted to a great degree in the manufacture of airplane engines for the Government. More than 250,000 sq. ft. of floor space were added to the plant last fall, but these additions have proved inadequate.

Collins Resigns From Jones—R. D. Collins, vice-president of the Jones Motor Car Co., has resigned. He has not made public his plans for the future, and no successor has been elected.

Shope Sales Manager for Zenith—V. I. Shope has been appointed sales and advertising manager of the Zenith Carbureter Co., succeeding A. H. Doolittle, who recently resigned. Mr. Shope was New York branch manager.

Olson Unit Enroute to New York—In spite of the weather, the Swedish Crucible Steel Co. started one of its Olson 2-ton truck units overland for New York. Two and a half days were required to reach Cleveland. A full load is being carried.

Landis Changes Elkhart Connection—I. D. Landis has been appointed sales manager of the Elkhart Carriage & Motor Car Co., Elkhart, Ind., and has already assumed his new duties. He was formerly advertising manager for the Crow-Elkhart Motor Co.

Liberty Ignition Buys Factory—The Liberty Ignition Co., Springfield, Mass., has purchased factory property containing about 10,000 sq. ft., and will manufacture Liberty spark plugs and specialties. It is reported that the company will start manufacturing about March 1. Edwin Rich is president of the new company.

Lane Truck Prepares Expansion—The Lane Motor Truck Co., Kalamazoo, Mich., will increase its capital stock from $25,000 to $225,000 to care for expansion and is expected to speed production up to ten trucks a week immediately. In the spring an addition of 60 by 100 ft. may be erected for the woodworking department, permitting an enlargement of the painting department.

Picard to Be Wholesale Only—A. J. Picard & Co., Inc., which started business in a small way in New York many years ago and has grown to be one of the largest accessory jobbing and distributing houses in the United States, has discontinued its retail store and will be exclusively wholesale. A. J. Picard, head of the company, has been identified with the industry for twenty years and is the dean of the dealers. The company covers all Eastern United States with a sales force of twenty-four men, handling a complete line of motor car accessories and serving several thousand dealers. The company is eastern distributer of the Stromberg carbureter, Gabriel snubber, Apollo Rubber Co., besides being national distributer of the Genemotor generator, starting and lighting system for Ford cars, manufactured by the General Electric Co.

Staybestos Opens New Offices—The Staybestos Mfg. Co. has opened an office at Detroit under the management of W. C. McComb, Jr., and another in Chicago with Edwin E. Coith in charge.

Barrett a Philadelphia Battery Manager—G. L. Barrett has been appointed manager of the Southwestern division of the Philadelphia Storage Battery Co., Philadelphia. His headquarters will be at St. Louis, Mo. Mr. Barrett formerly was president and general manager of the Willard Storage Battery Co. of Texas.

Famous Schedules 1500 Trucks—The Famous Truck Co. plans the production of 1500 trucks during the coming year and it is stated that all these are at present contracted for. Three truck sizes are manufactured, a ½-ton, a ¾-ton and a 1-ton model. These are completely equipped with bodies manufactured in the plant.

Saxon Pushes Work on Plant—The Saxon Motor Car Corp. is pushing work on its new plant as fast as labor and material will permit and it is expected that within thirty days it will be completely inclosed and that manufacturing will start within ninety days. H. S. Benjamin has been appointed sales manager. He formerly was with the National Cash Register Co.

Auto Body Co. to Expand—The Auto Body Co., Lansing, Mich., will increase its daily production by seventy-five bodies beginning Feb. 1. An order for 12,000 bodies has been obtained from the Scripps-Booth Co., and work on this contract will be started the first of February. The present production is 300 bodies a day, of which the Olds Motor Works takes 100.

French Leaves National for Army—Lucius French, advertising manager of the National Motor Car & Vehicle Corp., has resigned to accept a commission of first lieutenant in the ordnance department. He will be attached to the motor equipment section, which is headed by Major W. G. Wall, formerly engineer for the National. Almas E. Vinton, assistant sales manager, will succeed Lieutenant French as advertising manager. The National company now has 112 men in the service of the Government.

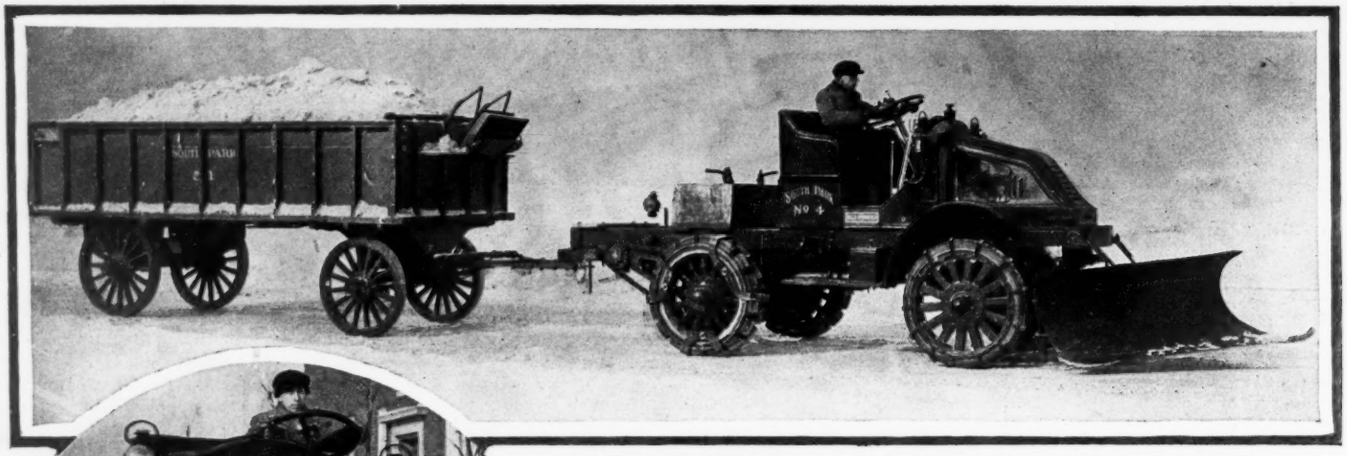
Coming Motor Events

MEETINGS

Feb. 1—Chicago, S. A. E., War dinner at Hotel Horrison.

SHOWS

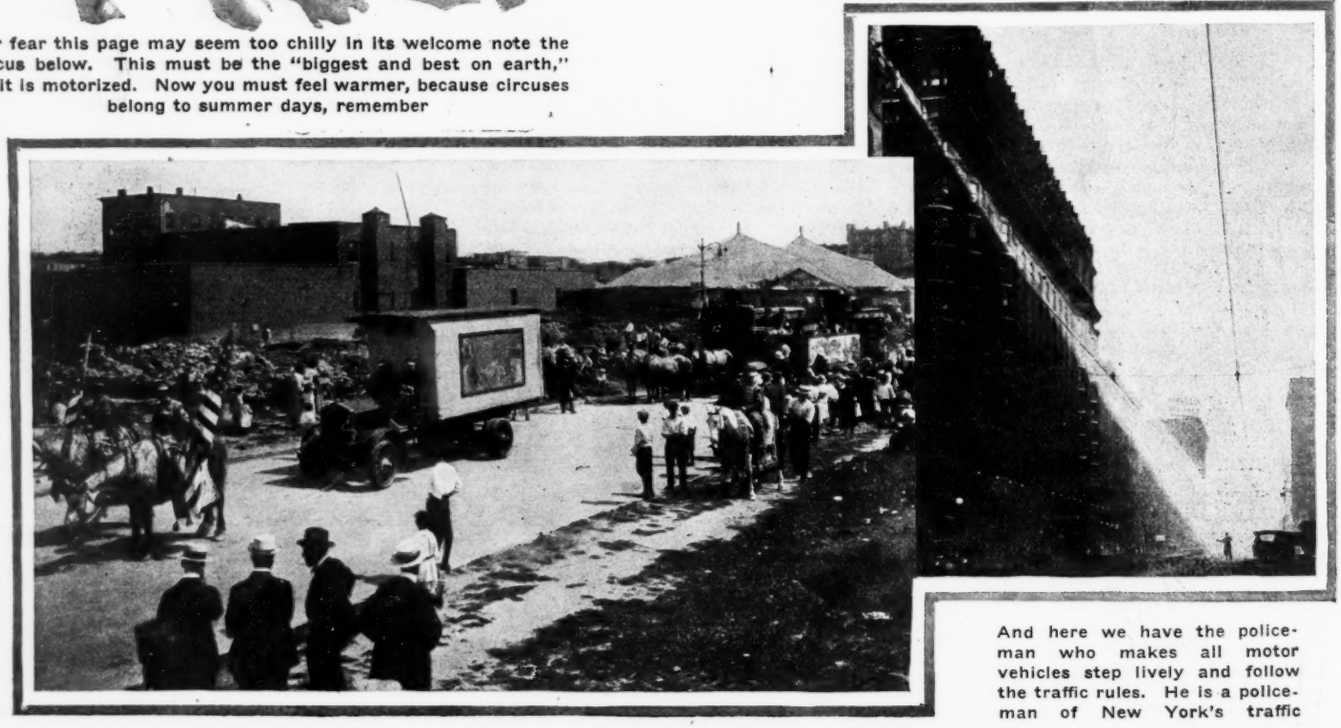
Jan. 9-27—Cleveland, Ohio.
Jan. 11-18—Washington, D. C.
Jan. 11-19—Providence, R. I.
Jan. 12-19—Philadelphia, Pa.
Jan. 14-19—Rochester, N. Y.
Jan. 16-25—Milwaukee, Wis.
Jan. 19-26—Montreal, Canada.
Jan. 19-26—Detroit.
Jan. 19-27—Cleveland, Ohio.
Jan. 21-26—Scranton, Pa.
Jan. 21-26—York, Pa.
Jan. 21-26—Buffalo, N. Y.
Jan. 21-26—Wilmington, Del.
Jan. 22-26—Oklahoma City, Okla.
Jan. 22-26—Baltimore, Md.
Jan. 26-Feb. 2—Chicago.
Jan. 26-Feb. 2—Harrisburg, Pa.
Jan. 26-Feb. 2—Columbus, Ohio.
Feb. 2-9—Minneapolis, Minn.
Feb. 5-9—Binghamton, N. Y.
Feb. 7-13—Portland, Ore.
Feb. 11-16—Kansas City, Mo.
Feb. 11-16—St. Louis, Mo.
Feb. 11-17—Toledo, Ohio.
Feb. 16-24—San Francisco, Cal.
Feb. 18-23—Syracuse, N. Y.
Feb. 18-23—Grand Rapids, Mich.
Feb. 18-23—Springfield, Ohio.
Feb. 18-23—Des Moines, Iowa.
Feb. 18-23—Duluth, Minn.
Feb. 18-23—Nashville, Tenn.
Feb. 18-25—Pittsfield, Mass.
Feb. 18-27—South Bethlehem, Pa.
Feb. 20-24—Quincy, Ill.
Feb. 20-23—Des Moines, Iowa.
Feb. 25-March 2—Salt Lake City, Utah.
Feb. 25-March 2—Muskegon, Mich.
Feb. 25-March 2—Indianapolis, Ind.
Feb. 26-March 2—Omaha, Neb.
Feb. 27-March 2—Columbus, Ohio.
March 2-9—Boston, Mass.
March 6-9—Clinton, Iowa.
March 6-9—St. Joseph, Mo.
March 6-9—Sioux Falls, S. D.
March 16-20—Great Falls, Mont.
March 20-23—Trenton, N. J.
March 20-23—Holdredge, Neb.
April 9-13—Stockton, Cal.



Since zero weather has come to Chicago to stay, apparently, this 3½-ton Kelly tractor equipment with snow plow has been doing its duty nobly, just as the White outfit just below evidently is doing its duty

From the Four Winds

For fear this page may seem too chilly in its welcome note the circus below. This must be the "biggest and best on earth," for it is motorized. Now you must feel warmer, because circuses belong to summer days, remember



And here we have the policeman who makes all motor vehicles step lively and follow the traffic rules. He is a policeman of New York's traffic